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*Municipal Records of Liverpool.**

IN the first volume of "Liverpool Municipal Records," brought out by Sir Jas. Picton three or four years ago, the author hinted that there was much of interest in the later records beyond the period with which he then dealt, but concluded that he must leave them to some future chronicler; and we expressed a hope in reviewing them at the time that such a chronicler would be found. We are glad to find that Sir Jas. Picton has, after all, been able himself to carry on the work which he had begun, in another thick and goodly volume, a suitable companion to the first one, and which brings the record down to the extinction of the old Corporation by the Municipal Reform Act.

These "Records," our readers may remember, are based on the MS. archives of the Liverpool Corporation and Council; and the first volume, ranging from the thirteenth to the seventeenth century, was full of passages throwing the most curious and interesting light on the manners and ways of past generations, and on the early history of the city which in recent days has, from a variety of causes, developed with such extraordinary rapidity from a sleepy little hamlet with a precarious coasting trade to one of the most noted seaport towns of the world. It can hardly be expected that the present volume, dating from 1700 to 1835, should have the same kind of interest as its predecessor; but it was certainly quite worth undertaking, and we cannot help suggesting how much of interest might be found if the municipal records of some other leading towns were similarly looked up, selected, and edited: the records thus unearthed having a "local colour" and character of their own which can hardly be imparted to a formally written history, though perhaps founded on some of the very same class of documents.

The progress of Liverpool commences, the author tells us, from the beginning of the eighteenth century, up to which time the town had been all but stationary. At this period the population of Liverpool was about 8,000. The first chapter of Sir James's book is devoted to Municipal Government, which now, as in the former period, seems to have had a good deal of the storm in the saucer about it, and "the proceedings in the Council at this period were anything but harmonious, being mixed up with party national politics on the one hand, and the local disputes about the charter on the other"; for at this time there was fierce dispute and recrimination as to the real meaning and power of the charter granted to the town in 1695. Into these semi-political portions of the history it is not so much our special interest to enter, though they contain a deal that is of interest in its way, and show the Town Council of the period as an amusingly pedantic and peppery body, very jealous of its privileges and very snappish in calling those to order who showed any disposition to encroach. We turn rather to some of the records as to the engineering and architectural doings of Liverpool as illustrated here. At the early part of last century it appears that the water supply question had already begun to cause trouble. Natural springs at the outcrop of the sandstone strata had been the source of supply for a long time, but as the town began to increase these failed in quantity and became polluted as to quality, and various tentative schemes are recorded, one after another, for bringing water into the town from the springs at Bootle, three or four miles off, all of which seem to have proved abortive for lack of energy or of money; an Act of Parliament was even obtained for making a grant to Sir Cleave Moor, "to bring water into Liverpool from Bootle Springs"; and eight years after two other proposers came forward; but all with the like result of a *fiasco*. 1731 and 1749 brought other schemes, all conferred about and all coming to nought. In 1779 the Bootle scheme again appears in reference to a dispute between the Council and Mr. John Jordan, "who is, or pretends to be, the assignee of the late Sir Cleave Moor" (these little amenities are quite common in the documents of the period); but the quarrelling did not bring the water; and it was not till 1797 that the matter (become pretty urgent by that time, we may suppose,) was really taken up seriously, and the proprietors of the Bootle Springs received powers to treat for a water supply; and even then the Council, in one of its fits of jealousy, tried to stop the matter by asserting their own privilege to look for and supply water. However, two companies seem at last to have been formed, one on the part of the Bootle owners, and one under the name of the "Liverpool and Harrington Waterworks Company," on the part of the Corporation; and these existed till 1846, when they were superseded by the Rivington scheme, now in its turn to be superseded by the Vyrnwy scheme.

In turning to the chapter on "Trade and Commerce," we come on the record of the construction of the first dock, which was set about in 1709; a characteristic minute recording that:—

"One Henry Hoss, of Derby in Derbishire, who came to survey the place where to make a dock with Mr. Sorocold, and draw a plan and estimate of the charge thereof, is admitted free of this Corporation *gratis*. But this is not to be a President."

The first intention was to deepen the stream which fed the Pool (a creek now completely extinct) and make a kind of ship's canal, but ultimately ground was granted for a dock properly so called, to be used for the purpose "for ever." This improvement appears to have been due to Thomas Steers, an engineer of ability and energy, who was at that time settled in Liverpool, and who was also appointed Harbour Master, and was architect for the erection of St. George's Church, still one of the Corporation churches. He was elected Mayor eventually. His "sallary" as Dock Master, on starting the work, was 20*l*. per annum from the Corporation and 30*l*. from the Dock. There was some quarrelling, however, over the making of the new dock; complaints that the "cawsey of the dock is so low that the tide overflows it into the adjacent cellars, to the great damage of the tenn'ts," and subsequently a denunciation from the Council in regard to "a most unjust insinuation and groundless protest" which had been circulated, "as if the Common Council (except a few of them) called and represented therein by the style of a Sett of men, have sold the dock to themselves and all the strand, in manifest breach of their trust," &c. That the council should be called "a Sett of men" was probably the great offence of this scandalous proclamation. On the next page we find a claim made by a certain Captain Nicholas Webb, who had taken the unusually bold step of building "a large ship, by recomendacon of our representative in Parliament Thomas Bootle, Esq.," to the effect that having agreed to take some lead upon freight from Wales, "which he runs the risque of hither by boat rather than take his ship to fetch it or load it from thence," he should be excused the town's custom for such lead; a request granted, but in the usual cautious manner, viz: that he should pay the usual custom, but the town's treasurer is ordered to return it to him again; apparently lest any kind of inconvenient "President" should be established. Then comes an order in Council to send thirty pounds' weight in gunpowder and seven pounds in cash "to blow up two great stones that lye just att the edge of the channell into Bowmaris (where many of our ships frequently putt into);" which shows what strides Liverpool was now making in foreign commerce.

* City of Liverpool. Municipal Archives and Records, from A.D. 1700 to the passing of the Municipal Reform Act. Extracted and Annotated by Sir Jas. A. Picton, F.S.A. Published with the Sanction of the City Council. Liverpool: G. G. Walmsley. 1886.

In commencing the chapter on streets and buildings, the author remarks that the founders of Liverpool "seem to have been singularly blind to any provision for the extension and improvement of the town." This, however, cannot be regarded as anything uncommon in the history of the development of a town; witness the narrow streets in the City in London, now so inadequate to their traffic. The chapters devoted to the subject of streets and buildings in the four periods into which these Records are divided contain much interesting information, and give a very graphic picture of the architectural and sanitary growth of Liverpool. In 1719 the unsatisfactory state of the pavement attracts the paternal Government, and it is ordered "that the Corporation do allow eight pounds towards amending the same, on the condicon that the person who shall undertake to doe it shall doe it effectually or repay the said 8lb." In the same year a contract is entered into with Alderman Gildart and Mr. Samuel Dove, to take away all the muck and dirt in the streets and passages twice every week, "and that they have liberty att their own charge to make a convenient hole, with an iron grate over it, att every street end, to be approved of by the mayor." In case of failure in this duty they were to forfeit 5s. a week. The same subject comes up in February, 1731:—

"The mayor now propounding that a proper person be appointed to take away the dirt out of the streets; it is now Ordered that if any person will undertake to crrry away the dirt in the streets twice a week, he shall have the muck for his pains, and two or three guineas a year, and that every inhabitant shall be obliged to clean their respective streets every Wednesday and Saturday, whereof publick notice to be given."

The "great necessity" of cleansing the streets seems to have been increasingly evident, however, a few years afterwards, and in 1742 Mr. W. Hornby, the Surveyor of Public Streets and Highways, was specially commissioned to take the matter under his charge, and see "that all the dirt and filth should be immediately carried away, and not suffered to lie or remain in the streets"; all former by-laws on the subject to be confirmed, and a bell to be rung to warn all persons to bring out his and their ashes and dirt to the carts. An improvement in lighting the streets was instituted, or attempted, in 1731, on the offer of several persons to be at the expense each of maintaining a street lamp, "if they can have such lamps placed at or near their dwelling-house free of the charge thereof,"—a curious mingling of public spirit with a regard for personal interests. In 1749, however, lamps at the end of the principal streets were ordered and provided for by the corporation.

The building of the Exchange, now the Town-hall, comes in question in 1740, the mayor representing that the Exchange is become decayed, "and that the pillars and one of the arches below have given way and are greatly shrunk, and that it is apprehended the great weight of the turret doth greatly tend thereto"; it was accordingly ordered that the turret be immediately taken down, and a survey made of the state of the rest of the building. This Exchange (the second) was built in 1673. In 1749 the plan of the new Exchange, "now laid before this Council by John Wood, Esq., architect (of Bath)," was approved, and the freedom of the town was conferred without fees ("be admitted free, gratis," are the words) both on "John Wood, Esquire, Architeck," and on "John Wood, junior, gentleman"; the latter, the son of the architect, acted as resident architect during the work; and Mr. Wood was to receive five per cent. on the cost of the building, and his travelling charges whenever he should come to Liverpool to superintend the building; young Mr. Wood's services as resident architect being given as a *quid pro quo* for this latter accommodation. Wood's building, tame though it may be in detail, is a very elegant structure in its way, and perhaps superior to any one of the buildings which he carried out at Bath, where his reputation was made. It appears, however, that the construction of the building was not considered satisfactory, for in 1764 occurs the memorandum:—

"Ordered that a survey of the Doom [*sic*] of the Exchange be made as to the expense of taking it down and fitting up a lanthorn in lieu thereof, to give light into the court room, as it is represented to the council that a continnance of the said Doom may endanger the building."

Twenty years or so improved the municipal spelling, for in an entry in 1786 it is written "Dome." After this latter entry there follow (1787) some directions for the alteration and further carrying out of the building, one façade of which it seems had not been completed; these plans to be submitted to a London architect of eminence; the consulting architect finally selected being Mr. Jas. Wyatt. It is worth noting that nearly a century later it was Mr. Thomas Henry Wyatt who was employed to design the present Exchange buildings surrounding the quadrangle in the rear of Wood's building. In connexion with the Town Hall there are some interesting entries about the presentation of some decorative paintings by "Mr. William Martin, historical painter," who wrote what would probably have been spoken of as a "very handsome letter" to the Council, expressing his admiration for all the improvements going on in Liverpool, and offering to present for the decoration of the Town Hall four large historical paintings of his execution, besides some smaller works in tempera, on the sole condition of the cost of carriage, frames, and packing-cases being paid, and permission given to have them engraved by Bartolozzi. The subjects of the paintings were: Lady Macduff surprised in her Castle at Fife; Cleopatra arming Antony; Queen Katherine's Vision; and Ferdinand's first interview with Miranda. The offer was gratefully accepted; but the pictures were destroyed four years afterwards in a fire in 1795.*

An entry under March 6, 1765, shows how the present duties of Borough Surveyor, in the absence of any Building Act, were anticipated:—

"It having been represented to the Council that Mr. Pickance and Mr. John Parr are going to project out Bow windows from their houses in Water-street, which designs, if carried into execution, may be attended with great inconveniences and annoyance to the town and inhabitants from the narrowness of the streets. It is Ordered that the Town Clerk do write to these gentlemen or any other persons who have formed such designs, desiring them to desist carrying the same into execution."

How far this request was successful does not appear.

The subject of street improvement on a large scale seems to have first come up about 1774, in and after which year there are several entries referring to schemes for the purchase of premises with the object of widening the streets; but these efforts seem to have been rather desultory until, in 1785, an Improvement Committee was formed, and an advertisement inserted in the Liverpool papers that this Committee would sit at the Exchange on every Tuesday till further notice to consider the best methods of improving the town, and that the Committee would be ready to receive and inspect such plans from any person who might please to offer them. The next year it is "the unanimous opinion of the Council" that a Bill should be drawn and brought into Parliament for the purpose of improving and widening the streets; and two or three weeks afterwards it is ordered "that Mr. Statham, Mr. John Gregson, and Mr. Brooks do, as soon as they conveniently can, go up to London to solicit the intended Bill for improving the streets," and they were to have a discretionary power to alter, defeat, or add such clauses as they might think proper. The petition was read, and the common seal affixed, on the 6th of February, 1786, and that one at least of the delegates earned the gratitude of the Council appears from the following entry of the same date:—

"Ordered unanimously. That the thanks of this Council be given to Mr. Richard Statham for the very great professional services he has rendered to this Corporation as one of the Select Committee in the purchasing of houses for the purpose of widening the streets in this town, and for the improvement thereof."

The Act, Sir James tells us, gave power, among other things, to improve the sewerage, which was now becoming a cause of great trouble, in very much the same way as it frequently has in parts of London, from the flooding of the lower streets, especially those on the line of the old "Pool," at high water; and an interesting passage, too long to quote, under date March 22, 1791, records the distress arising in the lower-lying parts of the town from the flooding of the cellar dwellings, many of the people not being acquainted with their situation till they found the water coming into their beds. The committee concerned with the matter take it very seriously, and say: "we should be wanting in our duty if we did not in the most earnest manner point out the means by which this dreadful evil may be remedied." They suggest enlarging the sewers and making some re-arrangement of levels to secure a better fall, but the author notes that this flooding from the continued action of rains and tides continued to be a source of serious mischief for half a century after.

We have touched only on a few of the points of interest in these curiously naïve and outspoken records, which, in spite of the selfishness and intolerance not unfrequently discernible in them, on the whole bear out Sir James Picton's claim for the old corporation, that its proceedings and policy were marked by vigour, tenacity, courage, and in the main by good sense. The two volumes furnish a remarkably realistic record of the struggles and progress of a city community, and the author is not saying too much in his concluding sentence, that "if five hundred years hence the Municipality of the coming age can present a record as full of interest and progress, of difficulties overcome, and of bright anticipation of the future, the task of its historian will be as pleasing as the one now brought to a close." We congratulate Sir James Picton on having so ably completed his self-imposed task, which has evidently been a labour of love, and may congratulate his local subscribers also on possessing so graphic a record of the history of their city.

* In connexion with the town-hall it may be noted that there is an entry, Feb. 14, 1792, for the surveyor to consult Mr. Wyatt about the propriety of getting the four figures for the north front of the Exchange executed "in artificial stone"; also in Portland, with a comparison of the cost. What "artificial stone" was this?

THE TREATMENT OF SEWAGE.

IN dealing with sewage on the practical scale of daily necessity, the command has always been to take the sewage to the land, and this has always commended itself to common sense. It has been known for long enough that sewage, after passing properly through the soil, does not pollute rivers or other streams of water, and all that town authorities have to do is to procure the land. They are not confined by any necessity to certain land not suitable, for if suitable land does not lie conveniently for receiving the sewage from the town by gravitation, it can be raised at very moderate expense to land which is suitable; and perhaps if there had been no chemists, with their bottles and laboratories, landowners might have been persuaded with a little pressure to come to fair terms with the town authorities. But because of the objections which have been made by the owners of land in suitable situations and of suitable quality for the purpose, town authorities have in many instances been driven to deal with the sewage in tanks. When that system has once been adopted it is not readily given up for another, notwithstanding that the proper working of it is a very expensive affair. It has been said by one, and confirmed by so many other men of experience as to have become an axiom, that towns must pay for getting rid of their sewage, and not, as they formerly did, look upon it as something out of which they could make money. That is the case in every instance, and however moderate the expense may be under favourable circumstances of situation; but where the tank system has been adopted and is continued, there seems some likelihood that the expenses will become enormous; for,

according to a paper read before the Society of Arts in April last by Dr. C. Meymott Tidy, the sewage ought, after undergoing the tank process, to be conveyed to land to effect the purification which cannot be wholly effected in the tanks. A smaller area of land is required for this purpose than is required for dealing with the sewage *in toto*, but, nevertheless, the expense of its conveyance must be the same, and what land is required must be purchased out and out; for, the area being so contracted, it cannot be farmed with profit, but will be a filter merely. An acre for from 5,000 to 7,000 of the population is what Dr. Tidy says would be required. If this would be sufficient,—and we are not doubting that it would be,—the requisite space of ground might be purchased at or near the outfall of the sewers, and the expense of conveying it to land at a distance would be unnecessary. But there are many things to be considered before we come to that detail. We will give them in the order in which Dr. Tidy stated them, not in his own flowing language when he read an abstract of his paper in April, but as they are stated in the full paper afterwards sent in, and printed in the Society's *Journal* of the 8th of October. Herein we find that the various precipitants which have been suggested to throw down in tanks the suspended and coagulate a part of the dissolved slimy organic matter of sewage,—lime, chloride of magnesium, sulphate and phosphate of alumina, and salts of iron,—are those for practical purposes to be used, alone or in conjunction with each other. In addition to these, clay and other weighting bodies, together with charcoal and other absorbing substances, have been added under various patents. In selecting a chemical precipitant five main points must be attended to:—1. That, consistently with purity of effluent, the chemicals used should be cheap. 2. That the precipitant should act as a deodoriser and disinfectant as well as a precipitant. 3. That the precipitated matters should subside rapidly. 4. That the maximum purity should be obtained with the minimum of deposit,—in other words, with the smallest quantity possible of chemicals. 5. That the sludge should part with its water readily. If lime and the sulphate of alumina combined be adopted as the precipitant, the quantity of lime, which is to be added first, should be such as to render the sewage faintly alkaline; probably at the rate of from five to seven grains per gallon will be needed for this purpose. It should be added as a milk of lime, and should be thoroughly stirred in by means of a paddle-wheel or other efficient mixer. A flow of a few yards should now be allowed, to permit the aggregation of the precipitate. This having taken place, a solution of crude sulphate of alumina, in the proportion of about five grains of the sulphate of alumina, is to be added, and the sewage again actively stirred. In the alkaline condition of the sewage the alumina will be precipitated, and will then combine with a portion of the organic matter, forming together an insoluble precipitate. Thus treated, the sewage should be allowed to flow into tanks, for the precipitated matter to collect. A portion of the lime will be at once converted into carbonate of lime, by combining with the carbonic acid present in the sewage, and serve as a weighting material, to aid in the deposition of the lighter flocculent materials. This mechanical action of the lime carbonate is of great importance. The flocculent suspended matter is, no doubt, one of the most important materials to remove, because it is that ingredient of the sewage which readily putrefies, and in this way causes a nuisance. It is, moreover, so light that, unless weighted, it is difficult to precipitate. A second portion of the lime combines with some of the organic matter in solution, producing an insoluble precipitate (of uncertain composition) of a compound of lime and organic matter, the subsidence of which is again assisted by the formation of the carbonate of lime previously described, and a third portion of the lime renders the sewage slightly alkaline. The alumina salt is now to be added. The alumina is precipitated, owing to the alkalinity effected by the slight excess of lime. This alumina combines with some of the organic matter in solution, not precipitated by the action of the lime. The power of alumina in combining with dissolved organic matter, and so removing it from solution, is taken advantage of in many commercial processes.

Respecting the iron salts, one strong objection to their use is that if the effluent be discharged into a river the stream is liable to be blackened from the formation of a sulphide of iron, a condition likely to be mistaken by the general public for a sewage deposit. As regards the use of phosphates as precipitants, the effluent is almost certain to contain some phosphoric acid, which greatly aids the growth of low forms of fungoid growths, amongst which may be included the so-called sewage fungus.

It is advisable that the effluent, before its discharge into a stream, be at least neutral and preferably slightly acid. This condition is easily brought about by the addition of a small quantity of acid to the effluent before its escape.

These directions are, no doubt, highly judicious and important; but there are others, as, for instance, that it is essential that sufficient chemicals be employed to effect complete precipitation, disinfection, and deodorisation of the sewage. No greater mistake can be committed than to starve the chemicals. To this must be attributed many cases where a precipitation process has proved a failure. A local authority will spend a large sum in erecting works, perfect in architectural detail, excellent for sewage treatment, whilst they shirk a small annual payment for the necessary chemicals. It is essential that after the chemicals are added the mixture should be well stirred; if not, they do not precipitate so much as they might, the process of flocculation is imperfect, and the difficulty of obtaining a clear effluent is correspondingly great. It is essential that there should be sufficient tank accommodation, so that, as well as for other reasons, the sludge may be frequently removed; otherwise, the freshly-precipitated sewage may be contaminated by the decomposing materials of a previous precipitation, or a nuisance result from a collection of decomposing matter. Many a good effluent is spoiled by foul materials being allowed to collect in the subsiding tanks. These materials undergo putrefaction, the gases given off contaminating the effluent. The solid matters becoming specifically lighter than the liquid by the gases of putrefaction developed in and amongst them, rise to the surface, the floating black masses presenting an objectionable appearance, and discharging offensive products into the air. After a time these black masses sink, and thus, by constant commotion of the precipitated matters, a turbid effluent results, which has a more or less foul smell. The defecated water should flow through a shallow open conduit of not less than a quarter of a mile before being discharged into the stream. The volume of the stream into which the effluent is discharged should be not less than eight times the volume of the stream of defecated sewage. The tanks should not only be emptied of the sludge, but thoroughly cleansed before being refilled. It is essential that the sludge should be frequently removed from the tanks. This frequent removal is necessary, firstly so that the effluent may not be polluted, and secondly, so that no nuisance may result during the removal of the sludge and the cleansing of the tanks. It is not enough merely to empty the tank of sludge, but it is imperative that, after being emptied and before being refilled, the tank should be well cleansed,—in other words, that the matters which stick to the sides of the tank should be completely and efficiently removed to prevent nuisance or fouling by subsequent decomposition.

We strongly recommend these observations of an eminent chemist to the attention of the managers of the sewage-tank works at,—we were going to mention places, a few, but will refrain. We desire to throw no obloquy upon the tank system of dealing with sewage because it is badly carried out, almost everywhere; but, having a strong impression of the difficulties of carrying it out properly anywhere, we desire to represent in contrast both the objections to and the advantages of the two chief systems of dealing with sewage, which are, on the one hand, the direct application to the soil of the sewage of towns,—whether by gravitation or by pumping is but a small consideration; and, on the other, the treatment of sewage in tanks in the manner we have pointed out. Much praise, well deserved, has been given to the staff of persons engaged in the A B C process, the effluent from which is unobjectionable, as the process is carried out at Aylesbury. Dr. Tidy speaks much in favour of the process The company who manage it appear to sell the residue at a considerable profit, and discharge from the works a clear and unobjectionable effluent water. Whether there is anything in it more than a strict obeyance of orders by the staff we do not know, those orders being to give a full dose of each ingredient day by day without exception, and intelligently to deal out and use the chemicals proportionately to the strength and volume of the sewage from time to time. Perhaps herein lies the secret. But let anybody go and see the tank process daily carried on at,—again we refrain, although the knowledge is common enough,—certain large towns where the tank system is that by which the sewage is dealt with before it is discharged. He will surely be convinced that the common way of carrying on the tank system of sewage disposal is one which is to be avoided if possible, unless the perfection of management of which Dr. Tidy speaks can be ensured. If this cannot be ensured the better way is to revert to the disposal of sewage on land directly. Much to-do is made of the possible neglect to turn the sewage this way and that from time to time upon different parts of the land. Proper attendance, of course, is necessary, and always with a responsible foreman, and neglect of this duty is sheer idleness. But let the turning of the sewage upon different areas of ground from time to time, and keeping the gutters in order, and ploughing the soil every second year, or third, as may be required, be compared with the numerous little things to be done to satisfy the chemist in the treatment of sewage in tanks, and if it be asked which is the more likely to be observed, it may safely be said that the open and above-board duties will be the better performed.

THE EIGHTEENTH EXHIBITION OF "OLD MASTERS" AT THE ROYAL ACADEMY.

THE present exhibition is undoubtedly one of the most interesting that has ever been brought together under the auspices of the Royal Academy. This is due partly to the fact that it contains more than fifty pictures belonging to Mr. R. S. Holford's famous collection, and some of the gems of the Duke of Wellington's gallery. The show of early Italian pictures is indeed scanty, compared with what we have been accustomed to look for in Gallery IV. Amongst Madonna pictures there is a small and genuine panel by Matteo da Siena (169), one (172) of the School of Francia, a signed picture (entirely repainted) by the Umbrian Tommaso di Fadino (175), a typical Crivelli (180) dated 1472, and a large archaistic panel (189) in good preservation, bearing the signature of Cola dell' Amatrici, and the date 1512. The gem of this room is a small, finely-finished picture, ascribed to Pesellino (204). It represents the Madonna enthroned between six standing saints. The faces are all beautiful and well characterised; the chord of colour is particularly pleasant; and the foreground is filled with a lovely carpet of plants in flower, the execution of the whole being Flemish in care and completeness, the design Florentine in gentleness and grace. A "Flight into Egypt" (195), by Cosimo Tura; a small "Crucifixion" (205), perhaps by Albertinelli (certainly not Umbrian); a Milanese fancy portrait (177), wrongly ascribed to Luini; a fine portrait of a lady (170), ascribed to Lorenzo Lotto, but really by Dosso Dossi; and a charming little "Holy Family" in a landscape (161), credited to Titian, but more probably by

Bonifazio Veneziano, also deserve attention. The portrait of a lady (156) does not represent Anne of Austria, and cannot be by Coello; it is a moderately good painting by some imitator of Sir Anthony More. The portrait of the Marquis of Caspic (158) is only a poor copy of the original by Murillo, which is in the Louvre. The study of a head (168) is perhaps a copy of some drawing by Leonardo, but is certainly not an original picture. "The Madonna" (171), ascribed to Fra Bartolommeo, is a copy of a well-known original, in an Italian gallery. Col. Sterling's full-size black chalk drawing (173), which agrees with the Rogers Madonna by Raffaelle, is not the cartoon for that beautiful picture, but is an old copy from the picture itself, perhaps done by Andrea del Sarto. The complete picture, from which the little panel (206) has been cut out, must have been a fine Madonna by one of the best Flemish artists of the fifteenth century. In some respects it reminds one of the "Exhumation of St. Hubert," at the National Gallery, by whomsoever that may be. Mr. Willett's Madonna (179), ascribed to Piero Pollainolo, deserves careful attention. It is a well-preserved example of a work of the important school of Verrocchio, and may be compared with the fine Madonna in the National Gallery, which it somewhat resembles, the position of the angel being changed. The forms of the features, the build of the child, the shape of his legs, and the brown tones of the whole are all clearly perceptible characteristics of the school.

The last picture in this room to which reference need be made is the magnificent bust portrait of Pope Innocent X. (160), by Velasquez, certainly one of tne finest works of portraiture which it has been our good fortune to behold, and in faultless condition. The three-quarter-length portrait of the same pope, seated, in the Doria Palace at Rome, is world-renowned. The Duke of Wellington's picture is in every respect as fine as that. We need not waste space in attempting to describe the beauties in it, which every spectator can see for himself, and which are practically impossible of translation into words.

Three more pictures in the Long Gallery claim the same master for their maker. The bust portrait of Francesco Gomez de Quevedo (111), likewise lent by the Duke of Wellington, is certainly the work of a good Spanish painter, but can scarcely be by Velasquez. The full-length portrait of Philip IV., with its fine scheme of colour, its powerful design, and its unequal execution, may not improbably have come from the master's studio, and have been touched by him in certain parts. The full-length portrait of "El Conde Duque" d'Olivarez is more reminiscent of Velasquez's touch, but in it also the hands of assistants have taken the largest share. The bust portrait of the Pope is the only picture here upon which no hand but the master's has been employed. Murillo's own bust portrait by himself (143) is a picture that should certainly attract attention. It is of unpretending character, low in tone, and simple in treatment, but it renders the aspect of the man as in a mirror, and bears unmistakable evidence of truthfulness to life. The same artist's picture of "Las Gallegas" (114), if it be by him, is a minor work.

No less than six pictures here are ascribed to Titian. One of these has already been referred to. Of the rest the portrait of Caterina Cornaro (129) can be at best a copy; the charming "Holy Family" (133), a good school piece closely connected with the fine original in the Louvre. The "Supper, Emmaus," lent by the National Gallery of Ireland, is an interesting school replica, but can scarcely be considered as an example of the master's handiwork. The influence exercised by Titian upon later painters is clearly seen in the very Venetian "Holy Family" (141) by Rubens and in the richly-coloured "Pan and Syrinx" (115) from Buckingham Palace, a picture not unnaturally ascribed to the same artist, but probably painted by Diepenbock or some such person. Turner's "Venus and Adonis" (149) is no less intentionally Titianesque, and was, doubtless, painted by the English artist after study of the "S. Peter Martyr," which perished in the flames at Venice.

A genuine Rubens, and a very fine one, is the "Elevation of the Cross" (122), the connexion of which with the famous Antwerp triptych is at once evident. It can scarcely be called a study for that picture, for it is a finished picture itself, and the grouping of the figures has been altered with a view to bringing the three parts together on to a single panel. The "Adoration of the Shepherds" (65) and the "Adoration of the Magi" (68) are genuine sketches worthy of notice. The latter subject handled by Rembrandt (123) in his most imaginative vein is the finest of the Queen's contributions to this year's display. It is in excellent preservation and quite unnecessarily authenticated by the artist's signature and the date 1657. Even more splendidly imaginative, more magical in execution, more lovely in effect is the glorious little sketch of an angel (183) by the same artist, lent by Mr. Sellar. The beautiful head is surrounded by a circle of mysterious lights framed within the outline of the shadowed wings. The portrait of Martin Looten (93), painted in the same year as the "Anatomy Lecture," is a first-rate example of Rembrandt's earlier style.

Lorenzo Lotto's noble portrait of a lady (124), of somewhat florid charms, is doubtless one of the three or four pictures by which this exhibition is likely to be remembered. The picture certainly requires explanation, for the drawing the lady holds in her hand and the inscription below it appear to be only interpretable as an insult. Holbein's "Laïs Corinthiaca" in the Basel Museum may be mentioned as analogous in this respect. The "Portrait Group" (134), by Jacopo Bassano, is a good picture, and the "Holy Family" (136) is, perhaps, the best example in England of the work of that very unequal artist Gaudenzio Ferrari. A full-length portrait (138) of "Alfonzo d'Este" is ascribed to Dosso Dossi. It looks more like a Spanish picture, but might, perhaps, be an early Moroni. The portrait ascribed to Tintoretto (139) can scarcely be by that master, unless it is a very early work of his. In some respects, notably in the landscape, it recalls the work of Sebastiano del Piombo.

Two fine portraits by Van Dyck (140 and 142) are lent by Lord Leconfield. The first, representing "Anne, Countess of Bedford," is a very charming picture. The original of the full-length portrait group of the "Earl of Arundel and his Grandson" (144) will be found in the exhibition at the Grosvenor Gallery.

The long south wall of Gallery III. is, as usual, occupied by a fine set of large pictures of the English school. The series commences with an unusually stately Romney, a full-length portrait of Mrs. Townley Ward (145); a full-length by Gainsborough follows, and then a landscape (147) painted by the same artist in his middle period, and consisting of the usual elements,—figures, with horses, a pond, a bare tree-trunk, a grove of trees, and a glimpse of distance. The finest Gainsborough here is the portrait of the Countess of Buckinghamshire (148). She is seen in full length, standing. Her dress is of the fashion made memorable by this artist's brush, which he has here wielded with all the dexterity attained by him in his years of completest power. Constable's "Dell in Helmingham Park" (151) is a picture well known to all lovers of that artist's works, thoroughly characteristic, and well worth the amateur's most careful study.

We had almost forgotten to mention the "Jubilee" pictures which occupy the place of honour at the end of the room. They are all well known from engravings. The only one of the four which possesses any pictorial qualities is Sir David Wilkie's "First Council of Queen Victoria" (117). The interest attaching to the other three is historical rather than artistic.

The gem of the second room, in which so many fine Dutch pictures have in former years been shown, is Mr. Holford's wonderful Cuyp (75), the long and narrow "View of Dort," once cut in half and framed as two separate canvases. It is flanked by two good examples of the work of Wouvermans (73 and 79). One of the most attractive of the group of pictures ascribed to Anthony Palamedes, a little interior (64) peopled by nicely-dressed folk, finds a place in this room, as does a more than usually interesting portrait of a lady (85), by Greuze. The sketch of a camp (88) ascribed to Watteau is more probably by Pater, who is again represented by another picture in the room. The landscape (92) is a more than usually good example of the work of Solomon Ruysdael, and the signed landscape (89) likewise shows Karel du Jardin at his best. Franz Hals is not so well represented as in some years he has been, but the portraits (80 and 97) are at all events genuine, whilst the sketch of three heads (95), if one of the slightest, is also one of the cleverest of the artist's works.

The exhibition of Turner's drawings commenced last year finds worthy continuance in the seventy-two examples with which two rooms are hung. The previous exhibition was memorable for the series lent by Mr. Fawkes, this year the place of honour is taken by Mr. J. E. Taylor, whilst Miss Swinburne and Mr. Vaughan also send important contributions. The drawings are hung in chronological order, we are thankful to observe, and the catalogue is unusually complete and accurate in its chronological data, doubtless owing to the co-operation of Mr. Rawlinson. Mr. Rawlinson's pamphlet guide to these two rooms (published by the Fine Art Society) should be in the hand of every visitor. The sketch of Wanstead Church is one of the landscapes drawn by the lad of twelve, and which his father took to Mr. Hardwick, the architect; it is lent by one of Mr. Hardwick's descendants. The "Lambeth Palace" of 1790 was the first work contributed by Turner to the Royal Academy's exhibitions. The "Abbey Church, Bath," is evidence of remarkable advance in power of architectural drawing, whilst the two "Salisbury" drawings stand on the highest attainable level in this kind. The "Norham Castle" of 1798 is stated to have been the drawing which chanced to lay the foundations of the artist's fame. Then follow a series of fine and finely-preserved works of the painter's period of power. The Richmondshire series of 1817 is represented this year by two of its most famous examples. Many splendid drawings follow. An early view of Durham (the property of the Academy) is placed out of its right chronological position, for the sake of comparison with a late rendering of the same subject. The collection worthily concludes with the so-called "Black Rigi," whose two companions were so much noticed last year.

NOTES.

WE have received some lithographs (plan, section, and view), issued by the "Niagara River Hydraulic Tunnel, Power, and Sewer Company," showing the manner in which it is proposed to utilise the fall of the Niagara for a perpetual power on a large scale. This, be it understood, is not by utilising the actual fall, but by diverting some of the water from the upper level through a long tunnel, with a fall of 1 in 200 over part of its course and 1 in 100 over the lower part, discharging into the lower river near the foot of the falls. This tunnel stream is to actuate a series of great wheels in pits at distances of half a mile apart, supplying power to a number of mills to be built on land to be conceded for the purpose, one section supplying fifty mills of 500 horse-power each. Of disfigurement of the actual Falls there appears to be no fear whatever from the scheme; but, of course, the country just adjoining the head of the Falls would be converted into a large manufacturing town. It must be remembered, however, that it will be free, to a great extent, from one of the great curses of manufacturing towns, smoke and vitiated air from furnaces. How far the scheme would be really beneficial to its promoters and the public depends to some extent on what may be thought of the convenience of the spot as a centre of manufacture. There is no doubt the scheme is prac-

ticable, and would supply an immense motive power at no cost after the first outlay, except ordinary wear and tear of machinery and plant. The first outlay would no doubt be large. It is difficult to make up one's mind how to regard such a scheme. It would sadly drive away the romance from one of Nature's great scenes; yet we cannot hastily condemn an idea which may prove a great practical benefit, although it is a shock to the feelings at first sight. At all events, if the commercial value of the undertaking is satisfactorily proved, we are of opinion that it will be done, and that protests will be unavailing. It might be otherwise if it were proposed to degrade the Falls themselves to the level of a mill sluice. Then the civilised world would probably be up in arms. But as the actual Falls will not be touched, there is room for two sides to the question.

THE fourth annual report of the "Metropolitan Public Gardens Association" indicates that the Association is very actively at work in schemes for securing breathing spaces and playgrounds for London. It shows a good record of work done, and a long list of places (disused burial grounds, &c.) which it is desired to secure and to lay out for public enjoyment. We wish the Association every success in its beneficent labours.

IT is not much to be wondered at that a certain feeling of suspicion is beginning to creep into men's minds as to the real intensity of the distress that is so prominently put before us each day. One would have thought that now, if ever, there would have been an eagerness to obtain a job, if only of a temporary nature, and that the only difficulty would have been to make a selection from the numerous applicants. But apparently there is no plethora of unemployed labour, for, notwithstanding earnest appeals, it is said that in different parts of London the offer was contemptuously refused. Mr. Hyndman, who of course sees no wrong in his socialist friends, defends them by various excuses, such as bad weather, too little pay, defective boots, &c.,—all excellent reasons for not working when other and better labour is to be had for the choosing. Cases of refusal were so numerous that we are constrained to believe that Mr. Hyndman has a very rotten case, and that there is not that amount of distress which he avers,—at all events, not in that section to which he belongs. The report of the Belgian iron trade for 1885, lately issued, contains some useful statistics on labour points well worth studying by our artisans, though doubtless they would not be very palatable. The wages at the foundries where the pig iron is worked up were at the rate of 2·96 francs per head (under 2s. 6d.) per day; in the steel works, 3·28 francs (2s. 8½d.). The wages of men working the coal averaged for the greater part of the year 2·22 francs (1s. 10d.) for surface work, and 2·99 (2s. 6d.) for underground work. A worse feature than all, perhaps, is the continued employment of women underground, to the number of 4,256, and 1,612 girls under sixteen years of age. We have, at all events, got rid of that reproach in this country.

THE general spread of the conviction that the neglect of our inland canals has placed our agriculturists at the mercy of the railway companies, has led to the formation at Sittingbourne of an association for the conveyance of fruit and vegetables to London by water. During the few weeks that have elapsed since the establishment of the service, it is stated that nearly 800 tons of fruit and potatoes, consisting mainly of hard fruits, have been conveyed by it to the markets; and that the amount thus saved by the consignees, as compared with the cost to which they would have been put for sending the same consignments by railway, amounts to nearly 250*l*. A saving of 6s. 3d. a ton on so short a distance as that from Sittingbourne to London is a matter of no little moment for producers. One advantage of the short distance is that the difference,—the possible difference, that is to say,—between the time consumed by the two modes of transit, is comparatively small. As to the cost, apart from fancy charges, or attempts to put on any description of traffic "what it will bear," which is the avowed policy of many railway companies, the fact is indisputable that water carriage will pay a good 5 per cent. profit at less than a third of the rate of freight at which 4 per cent. can be earned on a railway. This is a fact depending on the two items of capital and working charges, and is independent of any other consideration. It is one of which manufacturers as much as agriculturists are gradually but practically becoming aware; nor can it be too widely known.

AMONG the hundreds of suggestions for commemorating the Jubilee Year of the reign of Queen Victoria, one of the most deserving of attention and support comes from our sailors. And perhaps it would be difficult to rear any monument at once so beneficial to the country, and so appropriate to the memory of the sovereign of our island kingdom, as would be a Harbour of Refuge for our fishing and mercantile navy. As to the urgent need of such shelter, there is no room for doubt. The Reports from the Select Committee of the House of Commons on Harbour Accommodation are most outspoken and decisive. On the East coast of Great Britain, with the exception of the natural advantages offered by Cromarty Frith, by the Firth of Forth, and by the Estuary of the Thames, there is not a single harbour which is adapted to meet the requirements of the Navy. During the five years from 1876 to 1882, the number of ascertained shipping casualties on the coasts of the United Kingdom averaged 3,300 per annum; of which 497 vessels per annum were totally lost, as were 738 lives in each year. Twelve million tons of shipping frequent the fairway of the North Sea. To provide a place to which this great fleet could run in time of danger would be a work worthy of the Jubilee of Queen Victoria. It would be an offering twice blessed in its results,—a means of saving picked and valuable lives, and a self-supporting mode of insuring mercantile property.

WE have received the preliminary prospectus of the "Roads Improvement Association," which has been formed with the view of taking up generally the question of roads in the whole kingdom, and digging an often much-needed spur into the sides of official bodies whose proper duty it is to keep the roads of their districts in good condition. The Association in its prospectus remarks that "various causes have operated to produce the existing state of things," which "state," we observe they do not define; but we are left to the conclusion that they consider it very bad. Among the "various causes" one of the chief is said to be "the employment of inefficient surveyors, ignorant of the first principles of scientific road construction and maintenance." This may be the case in many places, for aught we know, but we must say, on the other hand, that it is only a very short time since we received a letter from a county surveyor complaining of the apathy and indifference of his Board on the subject of roads, and that they would not allow him to carry out the treatment he thought necessary. The state of our roads, in fact, varies very much in different districts; in some places they are well looked after, in others they are, unquestionably, disgracefully neglected; and as far as we have noted we think this neglect is more common and more marked in suburban neighbourhoods than in the case of country roads. At all events, there is plenty of field in this country for the exertions of the Roads Improvement Association, and we wish them success. Lieut.-Col. Savile is the Chairman of the Association, and Mr. Frank Thomas the Secretary.

TWO old London landmarks will be obliterated by the widening of Little Tower Hill for making an approach, on the Middlesex side, to the Tower Bridge, which is in course of construction. On the left, or eastern side, is the site, at present partly covered by the premises of the St. Katharine's Docks Company, of Hangman's, *alias* Hanson's (also Hamsden's) Gains. So strange an appellation carries us back to more than 300 years ago. It is, in fact, a corruption of Hammes and Guynes, and was given to a locality which was assigned to the poor traders therefrom when those places, along with Calais, were lost to the English. Across the road, and directly opposite, is a little burial-ground, lying within the Tower Gardens railing, and occupying part of the glacis to the counterscarp of the moat below. The graveyard is said to have been made for the use of the garrison on the breaking out of the cholera epidemic in 1832, and to have been finally closed twenty years afterwards. Now almost entirely occupied by Mr. John Jackson the contractor's temporary offices, it has hitherto escaped the notice of topographers. Some headstones may still be seen against the low parapet wall. The Corporation are about to remove the remains of interments therein to the City of London cemetery at Ilford. The memorial stone to the watermen's dog has also gone, together with the wall in which it was set, at the head of Iron Gate stairs. The recent destruction of Postern-row (*olim* St. Swithin's-alley), and the southern side of George-street, just across the ancient London wall, on the northern side of the Tower, involves the disappearance of a once notorious quarter; for there used to assemble the press-gangs before setting out upon their expeditions amongst the purlieus of East Smithfield, Wapping, and Ratcliffe.

SOME interesting particulars are given in the *Annales des Ponts et Chaussées* of the evils that may arise through the use of cement made from stone containing a large proportion of magnesia. In consequence of the favourable nature of some tests made in the laboratory of the École des Ponts et Chaussées, and others made at the Port St. Nazaire, permission was given to use, in the construction of some railway bridges, a cement made in some newly-established works at Campbon, in Loire-Inférieure. The arches in which this cement was used were in three bridges over the River Oust, opened in 1881. It was also used in the abutments of a railway bridge at Nantes. About a year after completion fissures appeared in these works, and these were clearly attributable to the cement in the joints having expanded by absorbing moisture. In other parts of the country, too, the distortion of arches, destruction of walls, &c., in which Campbon cement was used, clearly indicated that it was not a suitable material for constructive purposes, even when not brought in contact with salt water. This Campbon cement contains a large proportion of magnesia, analysis of five samples showing the proportions to vary between sixteen and twenty-eight per cent., and the swelling of the cement was attributed to its presence, a view which was confirmed by comparative tests made with ordinary cements.

SINCE the excavation of the Temple of Æsculapius at Athens, and more recently of the mother temple at Epidaurus,—to which we have frequently had occasion to draw attention,—special interest has been roused in all monuments connected with the worship of the healing god. Prof. Von Duhn (in the *Bulletino* of the Roman Section of the German Archæological Institute, vol. iii., part 3) publishes two bas-reliefs which have remained in the Palazzo Rondinini since 1764; they are valuable both as to subject and workmanship, and seem to have been two of a series connected with the cult of Æsculapius, on the Insula Tibernia, now known as the Isola di S. Bartolemeo. The first bas-relief represents the river god Tiber, in the form of a bearded man, rising from the reeds of his bed and extending a cup to catch the water flowing from a fountain on the rocky island. In the background, on the island, is a temple; the sacred snake (the symbol, and, indeed, in some cases, the incarnation, of the god) issues from a hole in the rock, and seems to be stretching out its head to drink. It will be remembered that about 290 B.C., when Rome was attacked

by a pestilence, her citizens sent an embassy to Epidaurus to ask help of Æsculapius; the ship on its return was followed by a sacred snake, which swam up the Tiber, and then chose the place for its own temple. The pestilence, of course, ceased.

GREAT interest attaches to the bas-relief because it is closely analogous to a coin of the time of Antoninus Pius, of which a good impression exists in the British Museum. On the coin we have, in a very similar composition, the snake, the rocky island and temple, and the river-god, but the Tiber seems here to be welcoming the snake instead of drawing water. The new element in the relief is the fountain, represented conventionally by an urn overturned. *A priori*, we should, of course, have expected that the snake would select a spot where a spring of water was close at hand, for the temples of Æsculapius were, to a great extent, hydropathic establishments. The spring is now lost, but, oddly enough, in the Mediæval church of St. Bartolemeo, founded by Otto III. (A.D. 1001), there still exists between the third and fourth steps that lead to the presbyterium, an antique puteal, with the inscription, "*Qui sitit ad fontem veniat potumque salubrem auriat ex vena . . . .*" and we may fairly suppose that the *vena* represents the spring from which, in ancient days, the serpent of Æsculapius drank. The meaning of the second relief is less clear: it represents a woman figure crowned, seated in a ship, of which she holds the helm. Taking it in conjunction with another coin in which Tiber is seated near the prow of a ship, it may possibly represent the sacred embassy to Epidauris. The style of both reliefs dates them securely about the time of the Antonines.

THE same number of the *Bulletino* contains an account of the terra-cottas found at Nemi. The excavations there should have some claim on English attention, as they are being carried out by Sir J. Savile-Lumley, our ambassador at Rome. Dr. Rohden, who writes the account, is perhaps the first European authority on ancient terra-cottas, and we must refer to his paper for details. The terra-cottas are both architectural and sculptural; a number of akroteria have been found with figures of Diana as the huntress, but the cult of the place was for the most part addressed to the goddess in her life and health-giving aspect as Lucina. In this capacity an immense number of figures were offered to her, with hands, feet, legs, and wounded limbs showing surgical treatment.

A DESCRIPTIVE Guide to Kirkstall Abbey* has been sent to us, headed with the title of the "Leeds Literary and Philosophical Society," and presumably read by its author, Mr. J. Wreghitt Connon, as a "paper" before that society. Mr. Connon has turned to good account his opportunities for studying the great abbey ruin which is so easily accessible from Leeds, and he has produced a good and readable account of it, accompanied by a small restored plan and birdseye view of the abbey as it probably existed in 1190; a sketch which, to those who are unacquainted with the history and habits of the Cistercians, gives a better idea than any words could give of the stern and severe architecture of that rigorous order, whose iron rule must have slowly withered out the feelings and lives of its votaries. Mr. Connon follows Mr. Sharpe in the general restoration of the plan, and the appropriation of the long western building as the lay brethren's quarters,—an interpretation which seems more natural and probable than any other that has been offered. A conjectural restoration of the abbey in the sixteenth century is also given. The author notes the curious kind of Nemesis whereby, when the old sternness of Cistercian rule had long departed, the raising of a more ornate upper story to the tower met with a kind of practical rebuke in the failing of the piers, which were not designed to carry anything more than the low unpretending Cistercian tower. Mr. Connon speaks, by the way, of the idea of a timber cloister or cloistral roof in the Cistercian building as conjectural only: it is surely about as certain as anything can be of which there are not the actual materials now remaining.

* MacCorquodale & Co., Leeds. 1886.

THE German Cement Makers' Association is an important body, its members representing a production of cement not far off a million tons a year. At the annual meeting last year, held in Berlin, a report was presented of an elaborate series of experiments made upon German cements purchased in the ordinary way of trade. The following are some of the most prominent results. The quickest time in which any sample set was three-quarters of an hour, and the longest time thirteen hours. To test for coarseness, a sieve of 5,000 meshes per square centimètre was used (over 32,000 per square inch), and upon this 49 per cent. of the total remained as a maximum, while the least residue was 20 per cent. The greatest specific gravity of any of the samples under test was 3·137, and the lowest 2·976. The greatest tensile strength was 49·4 kilograms per square centimètre (702 lb. per square inch), and the least tensile strength 22·75 kilograms per square centimètre (323 lb. per square inch). These tensile strengths were obtained after twenty-eight days with hand-made briquettes. Some sand tests, made after the German method, first introduced into this country by Mr. Grant,—a mixture of one of cement to three of sand,—gave a maximum tensile strength of 23·45 kilograms per square centimètre (333 lb. per square inch), after twenty-eight days' immersion. The lowest results on such a test were 6·66 kilograms per square centimètre (94¾ lb. per square inch). Hand-made briquettes gave slightly higher results than those made by machine. Crushing tests of the same sand mixture gave a maximum of 235·43 kilograms per square centimètre (3,348 lb. per square inch), the minimum being 40·4 kilograms per square centimètre (574 lb. per square inch). Briquettes that were submerged for fourteen days, and then exposed to the air for fourteen days, had 50 per cent. increased strength compared to those immersed in water for the whole twenty-eight days. The table in which the results of the trials are set forth contains a great number of figures, there being three independent operators engaged in making the tests. A discussion arose on the paper, in which the subject of machines for making briquettes took a prominent part. Bohme's and Kœmp's machines appear to have been used; but the latter is said not to be relied upon for regularity in result, and it was decided to use Dr. Bohme's apparatus, which compresses the material in the mould by means of a falling hammer for standard tests. In Kœmp's machine any irregularity in lubrication was found to vary the results. The adulteration of cement was also discussed at some length. In the tests referred to, one sample was found to contain slag, and this took greatly from the quality. It was stated that the large export trade of cement once carried on between Germany and Australia had been greatly injured by the adulteration of German cements.

THE two explosions of kitchen boilers which have occurred this week, and which were attended, unfortunately, with fatal consequences, suggest forcibly the urgency of supplying these domestic reservoirs with safety valves, or with lead or other fusible plugs which will melt or give way under high pressure or heat, and afford an escape for the pent-up steam. Without disparaging the general order of intelligence which is usually engaged in the kitchen, it may be said that it is not of that kind which is likely to be conversant with, or sufficiently on the alert to take at the proper time the necessary precautions to prevent, such explosions as occurred at Acton and Shepherd's Bush. In the former case it was a self-acting, high-pressure boiler. There had been no fire in the grate from six o'clock on Saturday evening till twelve o'clock next day; and the fire had been on for about two hours and a half when the explosion occurred. In the interval between Saturday night and Sunday midday, the keen frost had rendered not only the cold-water tank, but the hot-water tank, and all the pipes connecting with both for a considerable length, one mass of ice. The sudden putting on of a fire, with the whole domestic water apparatus in a completely frozen state, with no escape for the steam generated in a boiler already partially filled with water, and gathering fresh sources of steam from the slowly-thawing ice in the pipes nearest the boiler, was followed by the inevitable result mentioned in another column.

A CORRESPONDENT of the *Pall Mall Gazette* on the snow removal question seems to have hit on the true solution of the difficulty. He says:—"Now that another snowstorm has come, let us turn the editors of the London papers into surveyors, and the surveyors into editors. The editors are the persons who know what should be done and how to do it. If there is any sceptic who would doubt this, let him read the leaders on the question which proceed from their pens, and he will see at a glance that they have the whole matter at their finger-ends." Cynical correspondent!

MR. EMERSON'S letter, which we print in another column, gives an explanation of his selection of drawings of his Cathedral design for publication. Certain drawings, it appears, were selected by the emissary of a certain journal who "called first," and then it was considered important that all other published drawings should agree with these. We are, of course, bound to accept the explanation, but we cannot regard it as an entirely satisfactory one even from Mr. Emerson's own point of view. Surely it would have been easy to say "that design is an alternative suggestion and not in accordance with the conditions of the competition; it cannot be published alone, but only as a suggestion to accompany the main design." That is certainly how the matter would have presented itself to us. Instead of that, Mr. Emerson allows a design which was not in accordance with the conditions to be published as his design, to the exclusion of the less effective design which was within the limits of site prescribed in the conditions of competition. This, we must suppose, was no more than an unfortunate carelessness; but Mr. Emerson can hardly be surprised if it gives occasion for comment.

TWO OLD PARISIAN JEWELLERS: BOURGUET AND BOURDON.

II.—PIERRE BOURDON.

AND now it is time to introduce Monsieur Pierre Bourdon to our readers. Here he is (or at least, here is part of him), cap on head and pipe in mouth (fig. 7), working out some new fancy in his mind, and by his side a little playful device which the smoke from his pipe very probably suggested to him. Like Bourguet's, his book is printed in a small oblong octavo form; it consists of three books or parts, each with its own title-page, and in one of the corners of the first page of each, a sketch of M. Bourdon himself busy designing. The three title-pages are almost identical; here is the third:—"*Sic fama circuit orbem.* Livre troisième. Essais de Gravure. Par Pierre Bourdon, Maître Graveur à Paris, où l'on voit de beaux Contours d'Ornements traités dans le Goût de l'Art, propre aux Horlogeurs, Orfèvres, Cizeleurs, Graveurs, et à toutes Personnes curieuses. Se vendent à Paris, chez l'Auteur, Place Dauphine. 1702."

The work therefore appeared at least twenty years before Bourguet's, and the designs it contains have little in common with those which were afterwards published by his fellow-craftsman and citizen. In the first place, he devoted himself entirely to practical work and not to the study of decorative principles pure and simple; that is to say, to designs intended for the beautifying of the objects he dealt in; and, in the second place, his work is almost exclusively confined to pure Renaissance ornament. But though their work had little in common, the workers had much: they both strove towards one end,—the purification of the taste of those who wrought in silver and gold: "Ces livres ou

essais de gravure," says Bourdon, "sont ausy utile à la Jeunesse pour aprendre le gout de l'art, et j'ai fait en Relief quelqu'un de ces ornemens pour mieux connoître la vérité des contours listels et feuilles qui lui sont propre."

Fig. 7.

It is, however, impossible to pass by without remark, the curious little drawing (from which we have only taken the head, fig. 7), which he gives of himself and his "churchwarden." He has evidently been impressed by the grace of the curves of the smoke as it curls upwards from his mouth and the pipe-bowl, and, catching their airy spirit, he has deliberately set them on his paper in conventional form. It is a pleasant fancy, and though he was not the first who had caught an inspiration so directly from the ebb and flow of natural curves, the little study of them which he has preserved reveals his own clear insight into the leading principles of decorative art, and emphasises them for the benefit of those who would follow in his footsteps. The idea had already been utilised by Von Bömmel about two hundred years previously, not as a study, but as part of the design, in one of the most curious of those curious grotesques which so delighted the hearts of German designers in the seventeenth century, and of which we propose to give some examples in a subsequent article.

Although Bourdon has only preserved one of his smoke studies, everything that came from his hand, however "cabin'd, cribb'd, confin'd" by the exigiencies of the object to be decorated, reveals his mastery over this fundamental principle of the tangential flow of curves. We know of no pure Renaissance work that can beat it, little that even approaches to it in excellence. These two little borders (figs. 8 and 9) we think will speak for themselves. The fact is that Renaissance ornament, by sanctioning the introduction of a number of extraneous objects, such as shields, torsos, heads, vases, fruits, *et hoc genus omne*, which have absolutely no part nor lot in the general structure of the design, has opened a smooth and easy way to a herd of incapable draughtsmen, who, not pausing to study the alphabet of their craft, have flooded the world with the veriest hodge-podge of heterogeneous rubbish that it is possible to conceive or dream of. We have said that in our estimation Bourdon's Renaissance work is excellent and worthy of the greatest admiration. Our criticism is directed not against the peculiar style of ornament which the Renaissance brought forth, but against those modern artists who, picking here a little, there a little, a torso or a shield from this, a vase or a scroll from that, have plastered our modern walls in every direction with monstrous nightmares of ornament. If there is one object more than another which designers in the Renaissance style affect to beautify, it is the long and narrow oblong panel on a pilaster. We must admit the task they set themselves to be an exceedingly difficult one, but the grotesque way in which they almost invariably accomplish it is worthy only of the speediest form of obliteration that can be devised. If any one doubts what we are saying, he will find a dozen examples to his hand at every turn; let him study them carefully, and honestly say if he can see a *scintilla* of grace or beauty in the ribbons and bunches of fossil flowers with which the space is choked, in the inaccurate weapons and armour, in the impossible pillars and other architectural scraps, in the hideous masks and faces, and in the high-class confectionery style of the appendages generally.

Fig. 8.

Fig. 9.

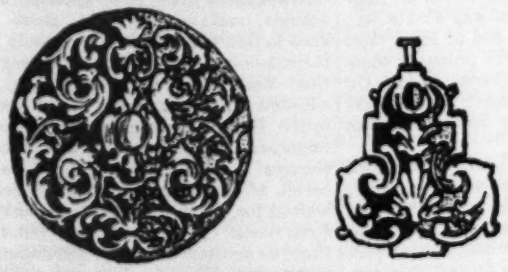


Fig. 10

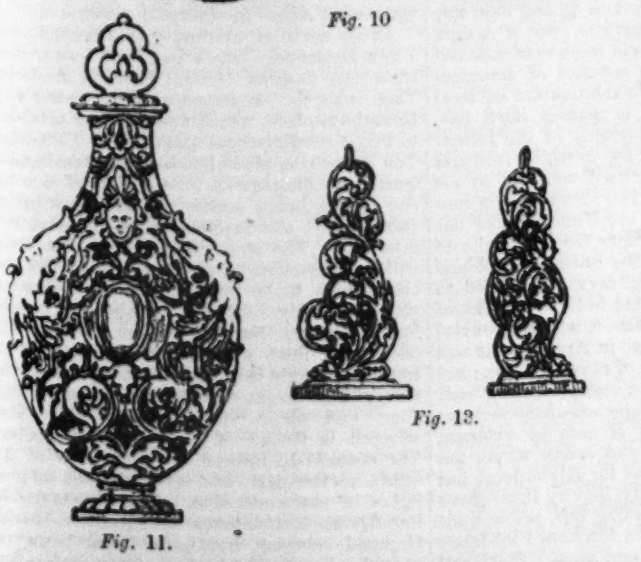


Fig. 11.

Fig. 13.

Fig. 12.

For ourselves, we think that the Renaissance style is at its best when the human or animal forms are worked into the general design and are more or less conventionalised, and that it begins to develope germs of weakness directly these forms are detached from the scrollwork and disport themselves among the branches thereof (in modern work we are frequently not even honoured by anything so homogeneous as a scroll); for this reason we prefer fig. 8 to fig. 9, though in this latter one the beauty and compactness of the scrollwork is such as to almost entirely conceal the bird and dog from view.

In fig. 10 we have sketched one of many designs for watch-backs, and a little piece of the interior economy of a watch: the former, as, indeed, all these watch-back designs are, is specially noticeable for the delightful way in which the surface is covered; the latter for its rigid simplicity and grace. In fig. 11 Bourdon has given his fancy greater play, and allowed it to run with greater freedom over the surface of a cup; and in fig. 12, over the slender form of what appears to be an embossed scent-bottle, or handle of some sort: in this the ascending and descending scrolls, with the stems and foliage working in opposite directions, seem to us especially good.

No other jewellers stand out so prominently as artists and designers as Bourguet and Bourdon. The collection of prints of ornaments in the British Museum reveals fragments of many books of designs of jewellery, which were issued as illustrated catalogues of the objects sold by the publisher. They must, for the most part, have been got up with considerable care and at great expense; but the designs are not of very great merit, and out of a great many plates we have been able to pick out two little designs for seals (fig. 13) as the only ones deserving of special notice; they are by F. J. Morrison, engraved by J. A. Pfeffel, and are interesting specimens of the goldsmith's art. It may be interesting to refer shortly to some of these catalogues. Louis Coquin, *alias* Corsin, *alias* Cauquin, published one, "fait par Gilles Lègaré, Orfèure du Roy," in 1663; the designs are fairly good and elaborate, but the whole of the details are realistic and bad; the chief features of the book are the jewels arranged as bunches of flowers tied up with ribbon. Balthasar Moncornet published in 1665 a similar book, with very weak designs; the special attraction to his customers being a series of landscapes, one of which appears at the bottom of each page; but the landscapes are as poor as the designs. Moncornet was a publisher, and merely issued a variety of "Collections" of works from other hands; the book in question has the following title-page:—"Livre nouveau de toutes sortes d'Ouvrages d'Orfèvries recueillies des meilleurs Ouvriers de ce Temps, et se vendent chez

Baltazar Moncornet, Rue St. Jacques, à la Belle Croix, vis-à-vis St. Yves. 1665."

Jean Vauquer's book, "Livres de Fleurs pour Orfèvres et Graveurs," contains some delightful engravings of flowers; but they are botanically correct, and as careful studies of real flowers as the most accurate botanist could desire. They are useless for the purpose for which they were designed. "Jardiniers" should certainly have been substituted on the title-page for "Orfèvres et Graveurs."

There is one other book of jewellers' designs, however, of great excellence, by Johann Bartholome Herbst, published in 1708; but he was a designer pure and simple, and not a goldsmith. His work has so many excellent qualities that we must reserve it for another article.

Fig. 14.—*Tailpiece from a Plate in Bourdon's "Essais de Gravure."*

THE ENGLISH IRON TRADE IN 1886.

IN closing our review of the iron trade during the year 1885 twelve months ago, we observed that the future did not appear nearly so dark as the year then at its close had led people to anticipate. To some extent this attempted forecast has not proved quite correct. The expected improvement did not set in quite so early as was hoped, although it made its welcome appearance at last. Nor have the causes which, it was thought, would operate towards a better state of trade been quite those upon which our anticipations were based. Shipbuilding, for instance, did not give the desired impulse to trade, the tonnage returns for 1886 being lower than those of 1885. The replacement of old material by new also did not proceed at the rapid rate hoped for, industrial undertakings being carried out with a caution learned from previous experience. But in one respect the past year has not only fulfilled, but even exceeded, the opinions formed at the close of 1885. The United States once more have given the chief impulse so much needed by the English iron trade, the demand from that country having been far heavier than was expected. Taking it altogether, the past year shows a substantial improvement upon its predecessor.

This improvement finds expression in the Board of Trade Returns. For the first eleven months of 1886,—the complete returns for the year are not yet available at the time of writing,—we exported 3,123,264 tons of iron and steel, of a total value of 20,098,968*l.*, against 2,910,347 tons, of a value of 20,128,374*l.*, in the corresponding period of 1885. It is estimated that the total exports of 1886 will exceed those of 1885 by about a quarter of a million tons. The serious feature in the above figures is the decrease in the value of the exported products, and this diminution is the chief characteristic of the trade of the past year. Prices, which were unremunerative enough at its beginning, steadily fell until the lowest ever paid were reached. Towards the last quarter of the year, an improved demand setting in from all quarters, and production, especially of crude iron, having been at last curtailed, values began to recover, until they are now better for pig-iron than last January, whilst finished iron and steel, if they have not quite reached the point they occupied at the beginning of the year, are at present exceptionally strong in price, with every prospect of reaching their former standards.

The chief causes of the drop in pig-iron, by the side of a decreasing demand, as shown by the shipments, were still production in excess of requirements, and the consequent accumulation of stocks. The total output of Scotch pig during the past year was 935,801 tons, against 1,003,562 tons in 1885; of Cleveland iron, about 2,403,000 tons, against 2,458,889 tons in 1885; of hematite iron in West Cumberland, 1,229,000 tons, against 1,219,300 tons in 1885. The quantity of crude iron at present stored in Scotland, according to latest returns, is 1,183,039 tons, against 1,056,683 tons at the close of 1885, an increase of 132,356 tons; in the North of England, about 600,000 tons, against 517,488 tons in 1885; in West Cumberland and North Lancashire, 350,700 tons, against 368,600 tons in 1885, a decrease of 17,900 tons. Finally, the shipments of Scotch iron, for the year ending December 25th, 1886, were 382,637 tons, compared with 429,640 tons at the same time in 1885; of North of England iron, 774,813 tons, compared with 835,033 tons in 1885; of West Cumberland iron, 507,767 tons, compared with 487,884 tons in 1885. Exact returns of the English production of pig-iron and the stocks at the end of the year will not be published until about the beginning of March; but the figures given above are sufficient to show that the output of crude iron in 1886 was below that of the preceding year, although for hematite iron there is a slight increase, owing to the growing demand for steel.

The value of pig-iron No. 3 G.M.B. was, in January, 31s. 3d.; the lowest price of the year (29s.) was reached in July; after which, under the influence of a better inquiry and the restriction of production by the Cleveland ironmasters, far too long delayed, it began to rise steadily, until it has reached 33s. 9d. for early delivery, 34s. and 34s. 6d. being quoted for spring and early summer contracts. Scotch warrants were 41s. 0½d. at the beginning of January last, from which price they receded to their bottom value (37s. 11d.) in the first week in March. Since then they have been fluctuating, but with a rising tendency, and they are now firm, with 44s. 7½d. as the highest quotation of the year, or 3s. 6d. higher than in January. Hematite iron was pretty steady at 42s. for mixed Bessemer parcels in the north-west of England for the best part of the year, but with the revival in trade the price went up to 46s., and was at the close of the year 45s. The rise in pig-iron, it will be seen, has been from 2s. 6d. to 3s. 6d. per ton on the year, and it need only be added that the crude iron produced in other districts has shared in this advance. The same cannot be said of finished iron, which has been very much depressed for ten months of the year, and consequently lost in value, although the difference in the quotations ruling at the opening and close of the past year was not great, the fact being that manufacturers could not go very much lower, and stopped work rather than take orders at prices involving positive loss. To give an idea of the general depreciation of finished iron, it need only be stated that the net average price of bars, plates, angles, and rails in the North of England at the end of October last was 4*l.* 11s. 6d., compared with 4*l.* 15s. at the end of 1885. But the last two months of 1886 will probably show a slight recovery from the lowest price. On the whole, finished iron has never been bought so cheaply in this country as during the past year.

The steel trade presents by far the best record of the past year, and it will probably be found, when the returns for the year are published, that, notwithstanding the depression prevailing in other branches of the iron trade, the production of steel of all descriptions during 1886 was as large as that of any previous year, if it does not exceed it, and that it will more than counterbalance the deficit in the out-turn of manufactured iron. The extensive substitution of steel for iron in shipbuilding is making itself felt, whilst the growing employment of the former material for other purposes in which iron has hitherto been exclusively used will add to the bulk of steel produced. The revival in the construction of railways in the United States has brought important contracts for steel rails to this country, and, with the orders on colonial account and by home railways, has helped to steady prices again. Owing to the operation of the international rail syndicate, which, however, we are happy to say, ended in April last, it was possible to keep up prices of rails at 4*l.* 15s.; but as soon as the combination collapsed, they went down to 3*l.* 10s. In consequence of the increasing demand, and the rise of rails in America, their value has crept up, and is now 4*l.* per ton for average sections. Steel for shipbuilding has enjoyed a tolerably steady inquiry throughout the year, but, notwithstanding this, prices went down in sympathy with the downward tendency of other classes of iron and steel. Steel and ship plates were at the beginning of the year 6*l.* 7s. 6d. to 6*l.* 10s., and angles 6*l.* 2s. 6d., and they are now 6*l.* and 5*l.* 15s. respectively.

The past year has been a bad one for the shipbuilding trade, the total tonnage launched amounting to only 473,675, compared with 540,422 tons in 1885, 750,000 tons in 1884, 1,250,000 tons in 1883, and 1,000,000 tons in 1882. The two latter years were abnormal as regards the tonnage of new ships, and the decline since then has been the direct consequence of the previous over-production. But there is every indication that the shipbuilding industry is reviving, and that 1887 will present a better record than 1886. Marine engineers have felt the effects of the dulness in ship construction. It is hoped, however, that with its revival and through the introduction of triple-expansion engines, more work will be provided for them. Other branches of the engineering trade have been equally depressed, excepting for special work. The consequence of the dull state of trade has been an almost general reduction in wages, in some cases quietly acquiesced in by the workmen, but in others leading to cessation of work of longer or shorter duration.

It will be seen from the above brief review of the English iron trade that the long depression of the last few years is over. Whilst the demand from America has been the principal factor in the revival, it should not be left out of account that the colonies also are buying more largely, and that the home consumption is growing, the improved trade in shipbuilding having likewise given a slight impulse to the iron and steel making business. To conclude. The clouded political horizon is giving rise to apprehensions as to a coming great war and to its baneful influence upon trade and industry; but with this exception, and unless every indication is deceiving, appearances are for a much improved trade during the year upon which we have now entered.

EDINBURGH NOTES.

QUESTIONS regarding the proposed new Municipal Buildings continue to be debated in the Town Council, and considerable feeling has been exhibited between the contending parties. The *Scotsman* has taken up a position of vigorous antagonism to the proceedings adopted by the Lord Provost and the majority of the Council, advocating delay, and protesting that they have not the confidence of the ratepayers. Numerous letters have been published in that organ, and ward meetings have been held protesting against what is expected to be a heavy expenditure, which in the present state of the City finances would prove oppressive. Sir James Gowans made a very pithy speech in support of the scheme, maintaining that there was always sure to be opposition to any matter involving an increase of the rates, but indicating at the same time that a more modified plan might be adopted than what many might desire; that to retire from the position taken would be most impolitic, as speculators would be certain to acquire the property scheduled; and that the result of the competition for plans should be waited for, in order to see what may be learned from them. It has been resolved, in the meantime, to procure an Act of Parliament, reserving matters of detail for future consideration.

At the northern extremity of Inverleith-row, a new Episcopal Church has been commenced, from the designs of Dr. Rowand Anderson. This church supersedes St. James's in Broughton-place, which was in close proximity to two other Episcopal churches in York-place. The Broughton-place building has nothing outwardly to distinguish it as a place of worship, the façade being merely an end block in conformity with the dwelling-houses to which it is attached. The new church when completed will accommodate a congregation of 600, but the portion to be built at present makes provision for only half that number. The plan for the entire building shows a nave with aisles, and deep chancel, 36 ft. long. At the south-east angle is a tower 24 ft. square, having vestry and organ-chamber on the ground-floor, and choir vestry above. The style adopted is Gothic of the fourteenth century. The chancel is lighted by a window of five lights to the east, and two windows of two lights in the south side. The nave is divided into five bays, with three-light windows in each. Grouped columns, having moulded bases and carved caps, sustain arches of two orders, and the roofs are open-timbered. The material to be used for exterior and internal dressings is Corsehill stone. The portion to be now completed will cost about 3,500*l.*

The Parliament Hall in Edinburgh Castle,

which is at present used as a military hospital, and has been divided by the introduction of floors and partitions, is about to be restored at the cost of Mr. William Nelson, publisher, under the supervision of Mr. Hippolyte J. Blanc, architect. The hall was constructed in 1434, and it is probable that when the plaster and other modern accretions are removed interesting features may be discovered. These will, of course, be carefully preserved and restored, and the open timber roof will receive due attention. The "garderobe" excrescence on the south front will be removed, and the built-up windows reopened. The number of patients at present accommodated in the building does not exceed a dozen, and arrangements have been made with the War Office whereby invalid soldiers of the garrison will be received into the Royal Infirmary.

A drinking-fountain has been placed in the Quadrangle of the University buildings. It is the gift of Dr. W. F. Cumming, and is designed by Mr. Sydney Mitchell in a style in harmony with the surrounding architecture. It is square on plan and 13 ft. high, and is built of freestone from Binny Quarry, which is of low tone and does not form a strong contrast with the time-coloured façade of the Quadrangle. At each angle are columns with green bronze bases and foliated caps of the same material. These support semicircular architraves, above which the roof slopes upwards, terminated by a foliated vase. At each angle of the roof there is a dolphin with its head slightly projecting, and their tails are gathered round the base of the vase. On each side of the square are semicircular niches with shell ornamentation at the top, and at the foot of this enrichment is a bronze head with two cups, attached to chains. From the bronze heads jets of water fall into projecting semicircular basins. The four pediments are enriched by the arms of Scotland, of the City, of the University, and of the donor respectively. The fountain is placed at the foot of the steps which lead up to the platform, on which stands the statue of Sir David Brewster.

The Warrender Private Baths Company, Limited, has received the sanction of the Dean of Guild Court to build baths in Thirlstane-road, at a cost of 8,000*l*. The plans have been prepared by Messrs. R. & R. Paterson, and the elevations, of two stories, are designed in the "Scottish Baronial style."

THE LION OF ST. MARK, VENICE.

SIGNOR GIACOMO BONI still pursues his indefatigable labours on the antiquities of his native city, and has addressed a long communication to the *Riforma* of Rome on the subject of the figure of the Lion of St. Mark; the one that acts "Stylites" on the column. It appears from Sig. Boni's two recent surveys, to one of which we recently alluded,* that the figure of the lion belongs to different dates, the greater part being, as he asserts, of the twelfth century, when the columns were erected by the Doge Ziani (1176), but that considerable additions were made to the lion on its return from Paris in 1815, after the fall of Napoleon, by whom it was stupidly removed, together with the bronze horses in front of the basilica of St. Mark. From the book which the lion holds between his paws, the words of the Gospel were effaced by the French, and the words "*Droit de l'Homme et du Citoyen*" substituted, which gave rise to the saying that St. Mark, like other folk, had turned over a new leaf. The wings, the paws, the tail, and the wreath upon the head appear to have been lost, as these parts are evidently modern. The Gospel is of lead, and the eyes of the lion are modern, and are not coloured. The other portions of the lion, including the body and the head and mane, are original, and are modelled without any parade of anatomical knowledge, but the details, where they occur, are remarkably well executed. The original wings, as was remarked by Mr. Ruskin ("St. Mark's Rest," i., 22), and corroborated by an old engraving and a picture by Bassano, were more extended than the present wings, and the feathers were more strongly marked so as to tell against the sky, as are the lions of St. Mark from the time of Jacobello del Fiore to the *donatus Venetus*.

The lion is 2 mètres 70 centimètres (about 8 ft. 6 in.) high; the capital upon which it stands is 3 mètres (about 9 ft. 9 in.) wide, and is 15m. 20c. (about 49 ft. 6 in.) from the ground. The pieces forming the lion, which are of bronze, are supported upon an iron framework, and are put together by iron screws and nuts, which are extensively oxidised. The granite column upon which the lion is placed has an inclination of about 1¼ in. towards the south-east, and was damaged by fire in 1756, but the injury is only superficial. The capital of the column is split.

Signor Boni proposes to take down the lion, to remove the present iron framework in the interior, and to substitute a new framework of bronze, to restore the missing portions of the lion in the style of the twelfth century, and to replace the eyes by balls of crystal fixed in the bronze.

There can be no objection to the removal of the framework, provided it can be shown that there is any danger to be apprehended to the figure of the lion; but the proposal to restore the missing portions appears a mischievous suggestion, and may possibly lead to the entire figure, together with the capital upon which it stands, being entirely renewed, and this cannot be contemplated without a shudder by anybody who knows how these things are done in Italy.

The two columns on the piazzetta were brought from Constantinople, and are clearly Byzantine. They were placed in their present position by one Niccolò Barattiero, who claimed as his reward that games of chance which were prohibited in Venice might be played between the two columns. One of these columns is surmounted by the lion of St. Mark, and the other by a statue of St. Theodore Tyro by Pietro Guilombardo (1329). St. Theodore was the patron saint of the Republic, but was superseded by St. Mark.

* *Builder*, vol. li., p. 190.

MAP OF LONDON SHOWING THE BOUNDARIES OF SURVEYORS' DISTRICTS.

WE publish this week the second section of this map.

Illustrations.

BANKING PREMISES, ETC., STEAMER POINT, ADEN.

BUILDING in Aden presents many difficulties quite peculiar to the place, consequent upon the exceptional circumstances.

There is abundance of stone, but most of it is excessively hard and difficult to work, but not one of the various kinds is durable or will stand the climate; and even did the place possess the most excellent of stone, there is no skilled labour to work it: consequently, all walls are built of thick rubble, plastered, and are of the most unstable character.

Few timbers or woods will stand the effect of the climate, and none will stand the ravages of the white ant but the best teak.

There are a few Chinese carpenters, but they are not generally capable of working to drawings, and can only make what they are used to.

The great heat and humidity of the climate affects and rapidly destroys all unprotected iron.

Skilled labour of every kind appears to be conspicuous by its absence.

The excessive heat makes the great requirement of a comfortable house a constant current and free circulation of air, only attainable by many large openings; whilst sand and dust storms necessitate the ability to close all parts when they occur.

A building of iron enclosed with wood was suggested as the best way of meeting these last requirements, but the slight protection such a building would afford from the heat and the rapidity with which it would decay was fatal to the suggestion.

Referring to the building illustrated, the site, which was partially occupied by old buildings belonging to the same firm for which these have been executed, is situated at Steamer Point, Aden, facing the harbour, and is bounded by a roadway on three sides, and forms the end building of the crescent adjoining the premises of the Peninsular and Oriental Steamship Company, from which it is divided by a roadway.

The front portion of the site is occupied by the main building, attached to the adjoining premises on one side and surrounded by verandahs 10 ft. wide on the front and side, and 6 ft. wide at the back, on all floors.

This building comprises on the ground floor (which is raised on a plinth 4 ft. from the roadway) general office, European clerks' office, manager's office, strong room, store-rooms, &c., the upper part providing residential accommodation for the manager and some of the staff.

In the rear of the main building, in the centre of the site, is a compound, whilst the side and back is occupied by a smaller building, containing, on the ground floor, all the cook-houses, offices, and servants' quarters for the house, the upper story providing three complete suites of apartments for members of the staff.

The building as erected is a substantial framework of iron stanchions and beams all securely bolted together, which carries the whole weight to be borne. The whole of these stanchions are incased in masonry, built up, after their erection, with local stone set in mortar, composed of chenam (coral lime), pumice, and sand, ground in a mortar-mill.

The whole of the front and side verandahs, and all pilasters, lintels, steps, landings, balusters, balustrades, and other architectural features of the main structure, are composed of artificial stone of a pleasant buff tint. The whole of this artificial stone was contracted to be made in England of a coloured cement facing and a backing of cement and coke breeze, and shipped ready to erect; but this was ultimately varied by one of the partners of the firm and two men going to Aden and, assisted by native labour, making all the large and simple work there, shipping only the moulds, mills, cement, and colour, and substituting pumice-stone for coke-breeze, whilst the ornamental and smaller parts were made and shipped in accordance with the original contract.

The walls are externally finished with a rendering of Portland cement stained a rich brown grey.

The plinth is built in coursed masonry, executed in a reddish-brown stone, but not tooled on the face.

The floors are formed of iron joists, 2 ft. 6 in. apart, filled in with 8 in. of concrete, composed of one of Portland cement, one of dust pumice, and four of pumice-stone broken to about a ¾-in. gauge. This material has given the most remarkable results in strength. The flat roof is similarly formed of two thicknesses of the same material, one 7 in. and the other 4 in., with an air-space between, and forms a perfect protection from heat. The floors are finished with tile borders and trowelled surfaces in coloured cements, whilst the undersides on ceilings are plastered with plaster of Paris. This is stated to be the first concrete floor ever executed in Aden, and certainly the first plaster ceiling. The work was all executed by local labourers, who had to be first taught.

The beams are also cased in solid concrete, and a mould run around all ceilings against beams and walls.

The walls internally are all plastered, the best rooms having skirtings, dados, walls, and friezes, all executed in Portland cement or plaster of Paris, stained with ground local marbles or other materials.

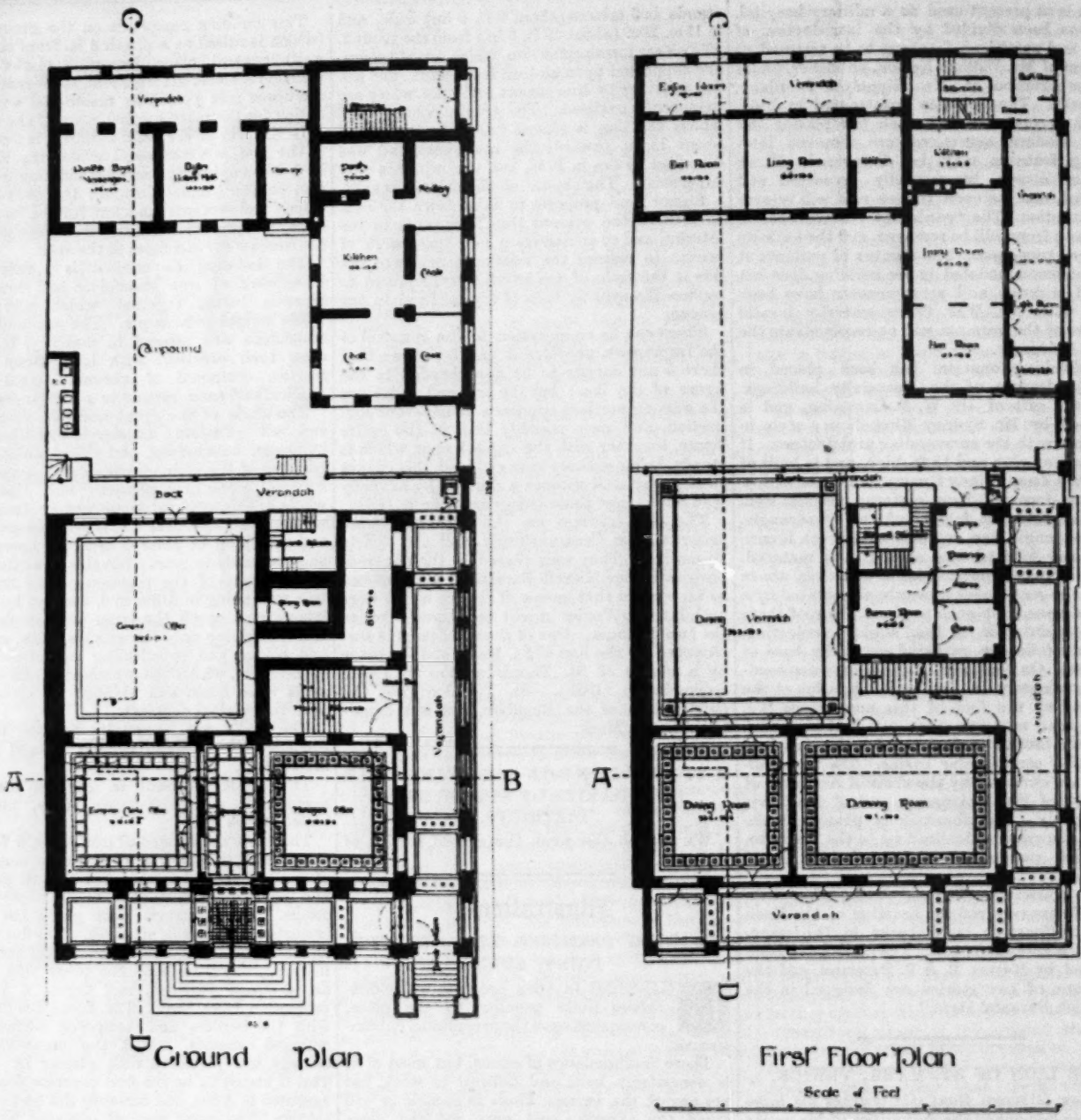
The windows are exceptionally large, and are all casements, and have fanlights nearly to the ceiling, glazed with stained glass. These open inwards, so that any current of air is directed downwards. All the ground-floor windows are fitted with outside shutters on jalousies so made as to fold into the thickness of the wall. On the first floor the verandahs are protected by lattice or jalousies on frames.

The doors and partitions inside the house are also all fitted with louvres, and all these louvres and those to the jalousies are made movable and adjustable, so that they can be closed and made to form a solid door or shutter, or open, so as to have in all cases through ventilation.

The whole of the fittings and fasteners, locks, keys, handles, casement (French and other), bolts, &c., were of special make and design, and executed in gun-metal and brass.

There are on the bedroom floor a great number of bath-rooms, this accommodation being necessitated by the climate. A large space in each of these rooms is formed as a water-tight tank, with a drain to the ground, and lined throughout with Dutch tiles, shipped direct from Holland.

The ironwork was executed by Messrs. Marshall & Hatch, of Bingfield Ironworks, and was so correctly set out, worked, marked, and numbered, that the whole was put together in Aden with the alteration of one or two bolt-holes only.



Banking Premises, Steamer Point, Aden.

The artificial stone was executed by the Albion Concrete Company.

The excellent joinery, all executed in the finest seasoned Moulmein teak, kilned and put together with pins and red lead (glue being perishable in the climate), was from the shops of Messrs. F. Sage & Co. The fittings were supplied by Messrs. Boobbyer & Sons. All the cement used on the works was supplied by the Burham Brick Company.

The building is for Messrs. Luke Thomas & Co., Limited, of London and Aden, who themselves shipped all the goods sent from this country.

The architect is Mr. Alexander Henry Kersey, of London, who personally superintended everything in England; whilst the buildings were erected and all native labour and materials were procured and paid for, and the whole local business was transacted by a representative, Mr. A. Hemingway, whom he sent out for that purpose.

Drawings were made of every part of the building for each trade, and detailed everywhere full size, and the greatest care taken to prevent mistakes or mis-fits when the work had to be erected, and in all cases with the most perfect success.

Mr. Hemingway was supplied with duplicates of all drawings; and the greatest praise is due to him for his skill and energy in instructing the men in accomplishing the erection of a somewhat complicated building with unskilled labour, and under the greatest difficulties.

Some of the furniture was specially made from the designs of the architect, and shipped from England.

INTERIOR OF THE CHURCH, FOUNTAINS ABBEY.

THIS view shows a conjectural restoration of the choir of the abbey church, as reconstructed in the early part of the thirteenth century. The spectator, from his position in the south choir aisle, looks into the choir, and sees glimpses of the magnificent "chapel of the seven altars" beyond. Mr. Reeve was, some years ago, employed for a considerable time in making most careful and exact measured drawings of every part of the ruins of the abbey, for the Marquis of Ripon, and was naturally led to make conjectural restorations of many portions. Our illustration is a reproduction of the chief of these, which he describes as "the result of a considerable amount of study."*

LADIES' HOME, WEST HOVE.

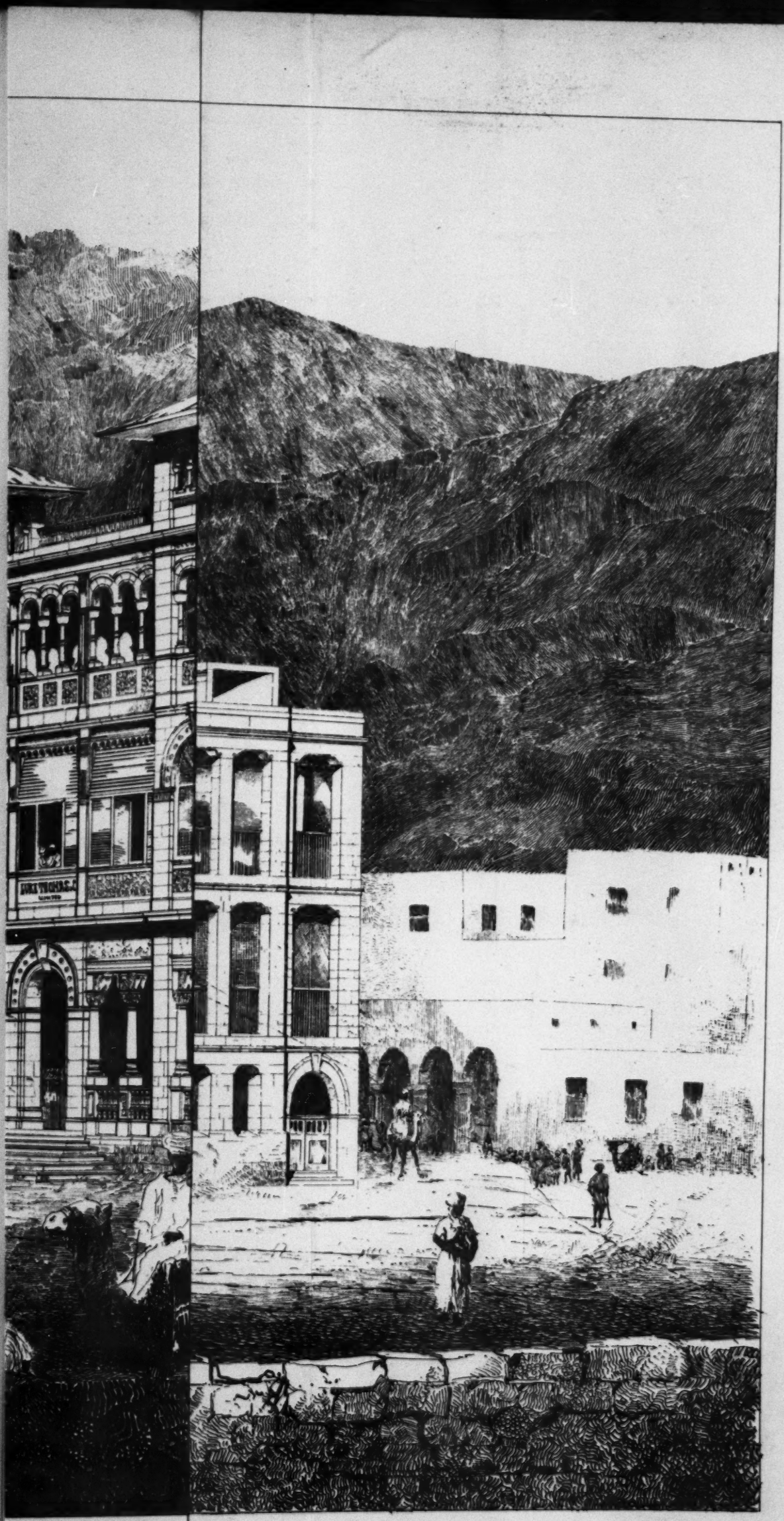
THIS Institution, now being erected at West Hove, from the designs of Messrs. Lainson & Son, is an asylum for ladies in reduced circumstances, and consists of eight separate tenements, each containing, on the ground floor, sitting-room, kitchen, scullery, &c.; and on the first floor two bedrooms and one w.c. The walls are constructed of stock-bricks with red tiles, brick facing; the dressings are of Doulting stone; the gables are of framed timber, filled in with "rough cast" and backed by 9 in. walling. The walls are built hollow, the intervening space being filled in with ½ in. of asphalte, thus rendering the rooms perfectly weather-proof. At the rear is a large garden, common to all the dwellings, with large shelter or summer-house in the centre. The cost of erection is being entirely defrayed by Mrs. F. H. McDonald, of Hove, who also intends to endow the institution. The builders are Messrs. Cheesman & Co., of Brighton.

* See report of a paper read by Mr. Reeve at the Architectural Association, and reported in the *Builder* of January 12th and 19th, 1884.

ALL SAINTS' CHURCH, PETERBOROUGH.

THE design we publish this week, by Messrs. W. S. Weatherley & F. E. Jones, was placed second in the recent competition. The restricted nature of the site and the approaches to the same demanded some such treatment of plan as is here adopted. The church was also to be an exceedingly cheap one, and to be built in sections.

Masonry Classes for Architectural Students.—The next meeting of the *large* class of masonry carried on at the Guilds of London Central Institute, South Kensington, under the auspices of the Architectural Association, will take place on Tuesday evening, January 11th, at seven o'clock. It will be devoted to making the drawings and moulds required for cutting the voussoirs of a straight-arch, covering a doorway with splayed soffit and sides. The members of the class are hereby informed that they will require cartridge paper and drawing instruments only. Students who wish to join the class are advised to join now while exercises in elementary masonry are still being done, for soon the class will be so far advanced that new comers will not be able to follow its studies.



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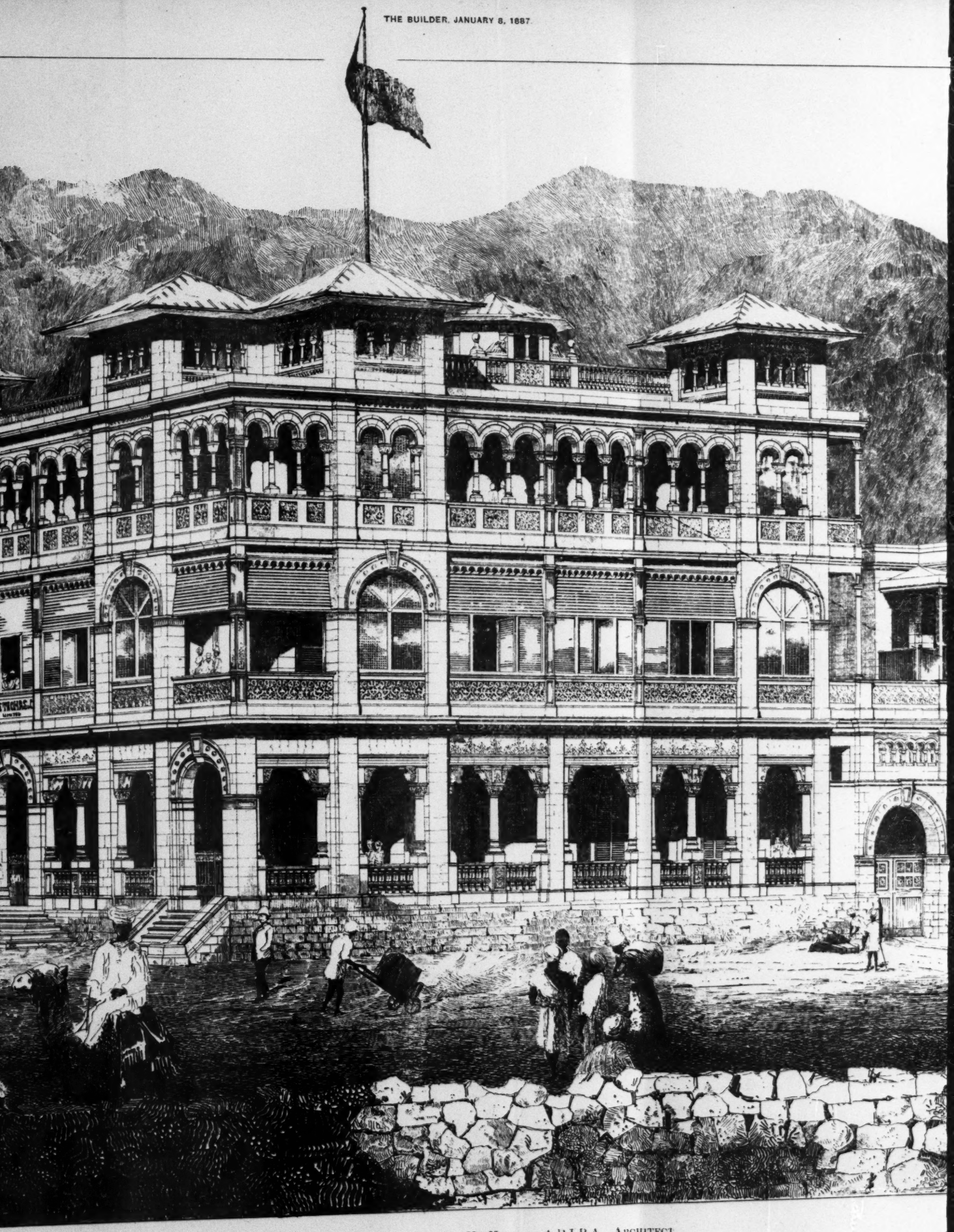
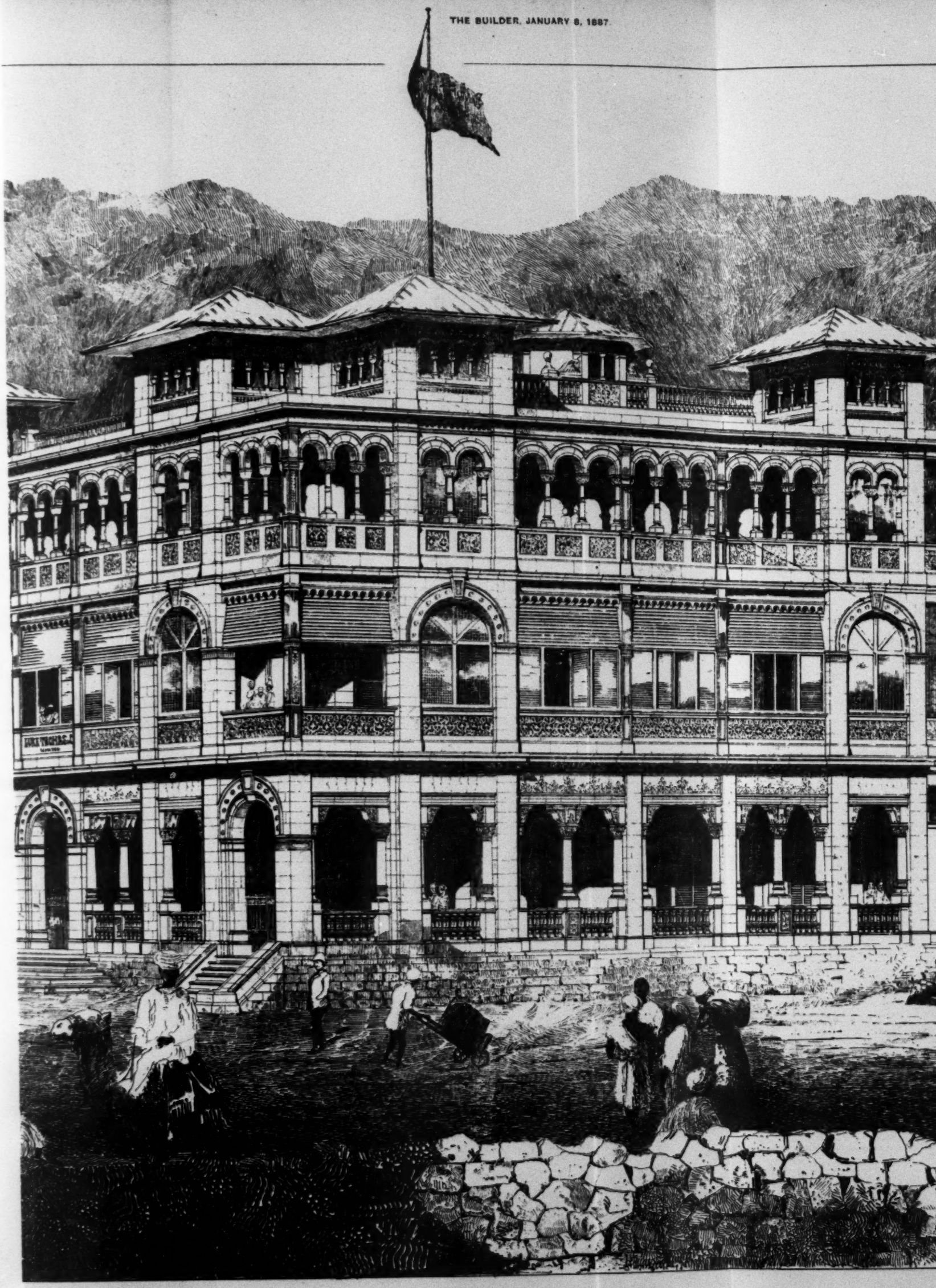


BANKING PREMISES AT ADEN.—Mr. A. H. Kersey, A.R.I.B.A., Architect.



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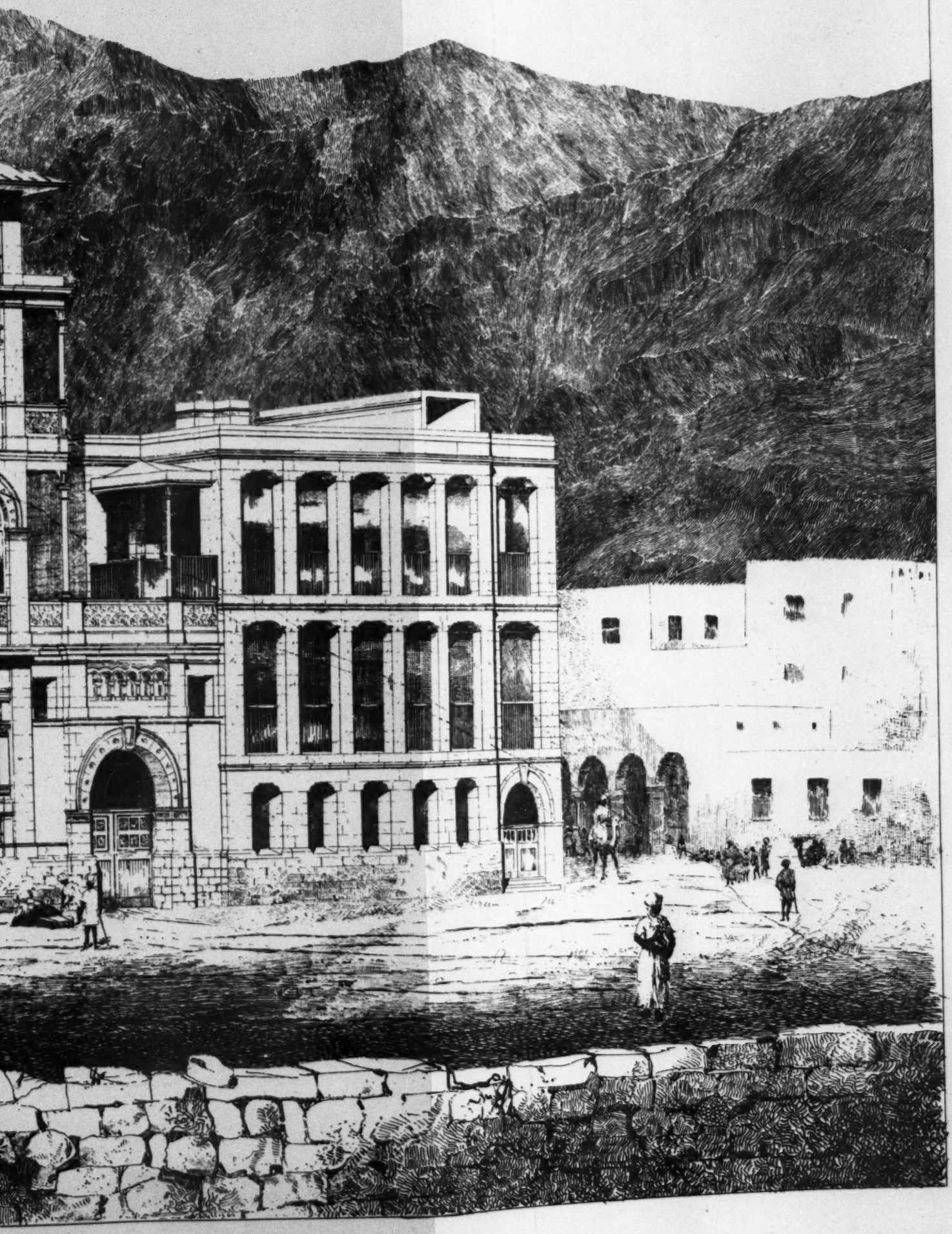

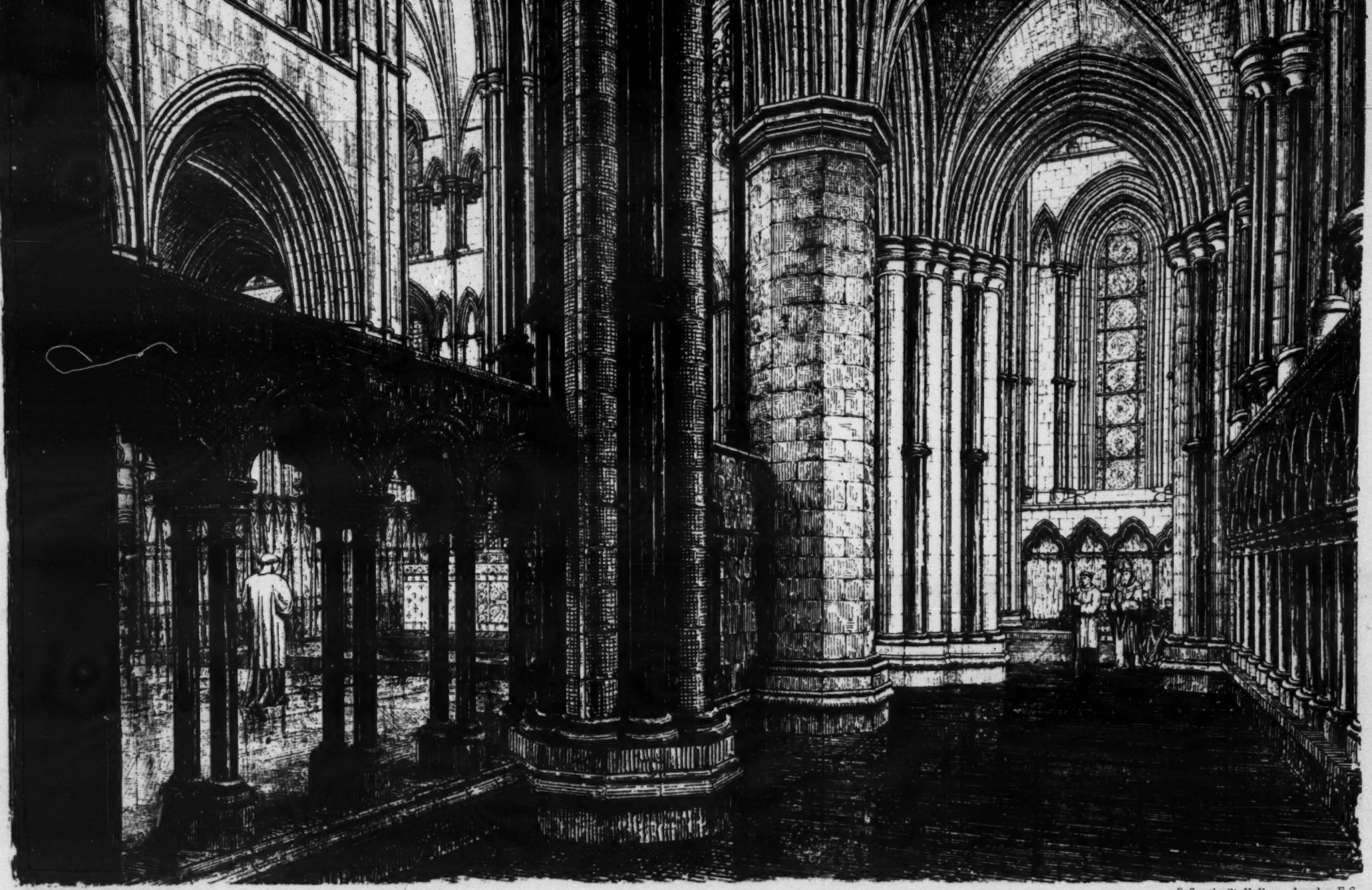

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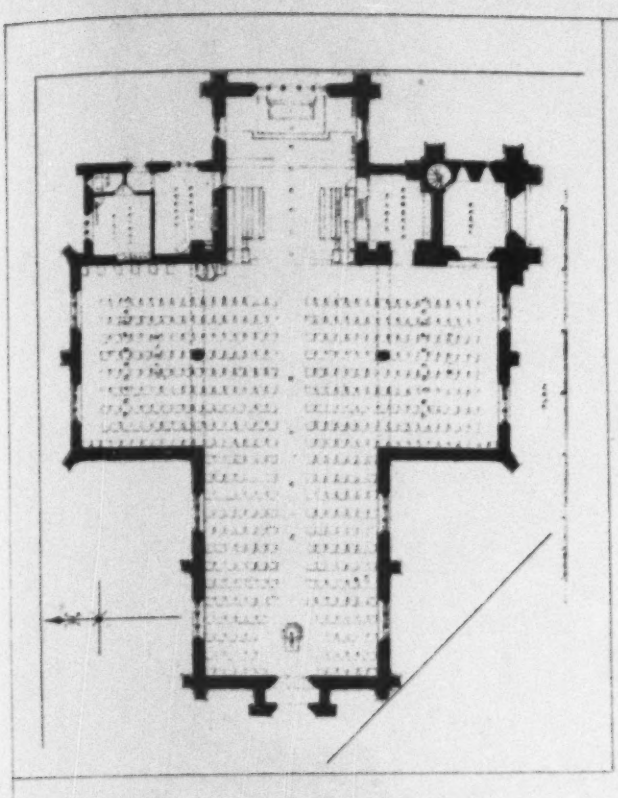
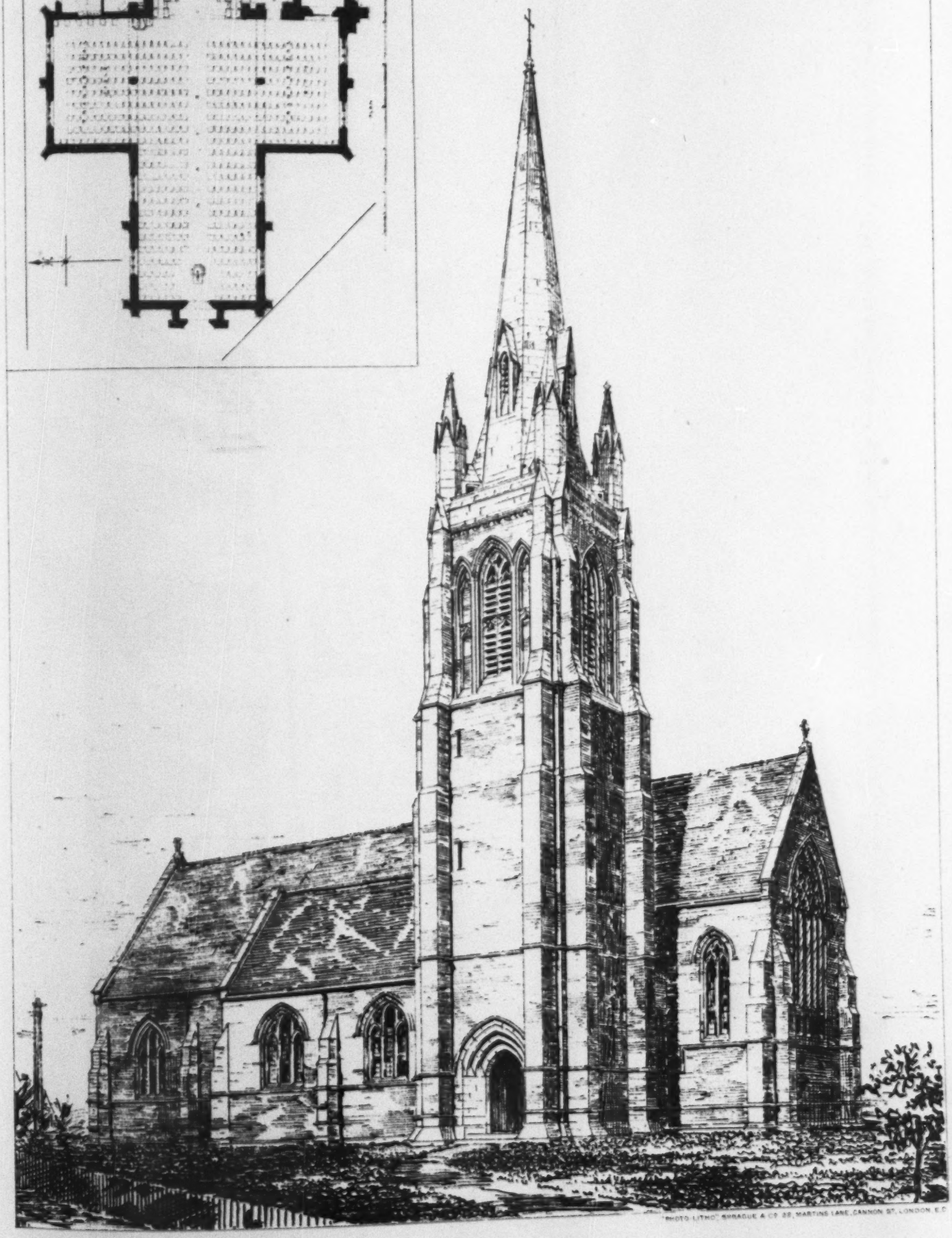
INTERIOR OF THE CHURCH, FOUNTAINS ABBEY (RESTORED).—By Mr. J. A. Reeve.

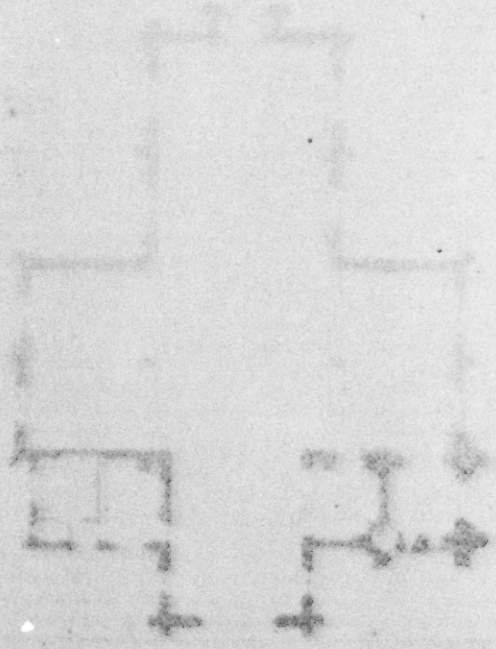
LADIES HOME, WEST HOVE.—Messrs. Lainson and Son, Architects.





'PHOTO-LITHO' SPRAGUE & CO. 28, MARTINS LANE, CANNON ST., LONDON, E.C.

ALL SAINTS CHURCH, PETERBORO.'—Design submitted by Messrs. Weatherley and Jones.



THE PUBLIC HEALTH ACT, 1875:

SUGGESTED REMEDIES OF ITS DEFECTS.

AT two recent district meetings of the Association of Municipal and Sanitary Engineers and Surveyors, Mr. William Spinks, Assoc.-M. Inst.C.E., has read a paper on the operation of the Public Health Act, 1875, with especial reference to the 150th section, with suggested remedies of its defects. After a few introductory observations, he said,—

No great originality is claimed for this paper. Lumley, Glen, Chambers, and the Reports of the Local Government Board have been laid under obligation, and the digests of cases arranged in a convenient order for reference, together with a short summary on the cases, in the hope that it will be found serviceable and handy to those who so often have need of their assistance in carrying out not the least important of the varied duties which fall to the lot of the municipal surveyor. It is now rather more than ten years since this Act came into operation, and of the 343 sections of which it consists, there is, perhaps, not one which is more frequently put into practice and applied by members of this Association than the 150th. That the draughtsman who drew the Bill and the House of Commons which amended its text in committee were not immaculate nor exponents of clear expression is proved by the very large number of cases which have gone to the Courts, and by the debate which took place in the House of Commons on March 10th on the second reading of Mr. Dodd's Bill to amend this and the 152nd and 153rd sections. It has, therefore, occurred to the writer that if the operations of this section were brought before you and a discussion taken upon it, much valuable information might be obtained that would serve as a guide to each of us in its working, and for this purpose I have prepared the following observations.

The course of procedure adopted by the writer in all cases is to report to the Board the condition of a private street, and to obtain from them a resolution calling upon him to prepare plans, sections, notices, and estimates of the works he proposes to execute. Upon the plan the houses are all numbered, and the full names and addresses of the owners given, the various widths, &c., are figured on distinctly, the lines of sewers and cross drains strongly marked, and also the positions of the manholes and gullies. The longitudinal section is plotted with reference to Ordnance datum, and shows the size, depth, and rate of inclination of sewer, and the intended level of the street and its relation to existing floor-levels. The transverse section is plotted on a large scale, showing the details of the formation, with the sizes and depths of the various materials clearly given, together with the rates of crossfall both of the carriage-way and footway. This he considers sufficiently clear and distinct for any owner to work to, should he elect to carry out the work himself as he has power to do. The notice is then drawn. For minor streets, which are not thoroughfares or only residential streets and not main arteries of traffic, a local sett is used in paving; the foundation is of macadam on rock pitching. In streets of the first class, granite paving is laid, and all joints are asphalted. Having thus prepared the plans, sections, notices, and estimates, he lays them before the Board for approval, who sign them and order the notices to be served, and pending the expiration of the stated time the documents lie in his office for inspection by the parties interested. Failing the carrying out of the work by the owners, the matter is again brought before the Board, who direct application to be made to the Local Government Board for sanction to borrow the amounts stated in the estimates. After the public inquiry has been held and the formal sanctions received, a resolution is passed to advertise for tenders, and a contract is entered into in the usual way. Prior to the contractor entering the street, a notice is sent to the owners calling upon them to remove all old materials. Upon completion of the works they are measured up and the total cost arrived at, to which is added five per cent. for superintending and expenses out of pocket, and this sum is apportioned amongst the owners according to frontage. Before laying the apportionment for approval, a preliminary statement of the sums arrived at as the portion of each owner is sent out, with a request that they will call and examine the apportionment and point out mistakes, if any there be. This is found to be an admirable plan, saving much annoyance in submitting a revised apportionment. The success of this system is proved by the fact that of the seventy apportionments made during the past two years, not one has been revised, and only one has been objected to under the 257th section, the reason given being that the work was "too good." No apportionment is laid for approval until every doubt is removed as to its accuracy, and then it is signed and ordered to be sent out to each of the owners, and the money to be recovered in the usual way, either summarily or by instalments spread over a term of years, as the case may be.

Having made a careful study of and inquiry into all the cases which have arisen from the operation of this section and the other sections correlative to it, the digests of which are appended hereto arranged in direct order, *i.e.*, commencing with the first line of the section and proceeding to the end, the writer begs to offer a few remarks explanatory of the meanings of terms and words as settled by the Courts, and also directions as to the procedure to be observed, and for that purpose will give them under the following heads:—

1. Street.
2. Repairable by inhabitants at large.
3. Notice to Owners.
4. Owner.
5. Premises.
6. Partial Works.
7. Sewer.
8. Service of Notice.
9. Deposit of Plans.
10. Default of Owner.
11. Apportionment.
12. Recovery of Expenses.
13. Disputes.

Street.—A "street," defined by section 4 of the Act, is "any road, lane, footway, square, court, alley, or passage, whether a thoroughfare or not," but it does not necessarily follow that it is a street within the ordinary acceptance of the term, which is a thoroughfare with houses on each side; the *primâ facie* meaning of the word is simply confined to the roadway and footway. A bridge over a canal or railway is also a street, and a *cul-de-sac* may be a street. The surveyor having satisfied himself that the road he proposes to deal with is a street, must then inquire as to its dedication. A road may have been used by the public as a thoroughfare; but if there has been no express dedication by the owner, this user does not constitute it a street, and the fact of its being laid out is not a dedication. A surveyor cannot, of course, ascertain what covenants are stipulated upon in leases as to the laying out of streets, but he should take all reasonable precaution to ascertain that the road has been dedicated. Unless a street is declared to be a "highway," under section 152, the provisions of this section may be put in force as often as occasion requires.

Repairable by the Inhabitants at Large.—These words are used in contradistinction to "repairable by individuals *ratione tenuræ*." The cases that have been decided under this head have been applicable to roads where tolls have been charged by the owners. In the case of Taylor *v.* Oldham, the Master of the Rolls (Jessel) delivered a very interesting judgment as to the operation of the Act upon courts and alleys.

Notice.—Particular care is to be exercised in drawing the notice and describing the work required to be done; and if words are added in excess of what is prescribed, it has been decided that the notice is bad; but a notice which is *ultra vires* as to part, but good as to the residue, can be enforced in respect of that which is valid. In cases where some owners do the works, and one or more are in default, it is not necessary to serve them with a fresh notice before doing the work. With regard to the service of notices, they may be given to the owner or occupier, but the owners only are responsible for the expenses if recovered summarily; and service is held to be good if delivered to the person who is *de facto* in receipt of the rent, and service at the owner's place of business by delivering and reading to his clerk is a good service. No provision is made in the Act for an objection to notice. Whatever objections an owner may have cannot be raised until section 257 comes into operation.

Owner.—The word "owner" includes any person receiving the rent of the property in respect of which that word is used from the occupier of such property on his own account or as trustee or agent for any other person, or who would receive the same if such property were let to a tenant.

Premises.—This word by section 4 means "messuages,—buildings, lands, easements, and hereditaments of any tenure." Under this definition many important and interesting cases have been decided, which are a useful guide to a surveyor. A railway or canal running parallel to and adjoining a street are liable, as also a railway crossing over a street; but where a road was carried over the railway it was decided that neither the railway underneath nor the slopes of the cutting could be said to abut on to the road, nor even the parapet of the bridge. There are many cases of premises, such as school-yards and courts, only having access to a street by means of a passage; in these it has been decided that the benefit of access to the street was the foundation for the liability; but an opinion has been expressed that where the passage is common the liability would not attach. From the cases of canals and railways before mentioned, it will be seen that they may have no direct or consequential benefit from the street, and the owner of a wall at the end of a *cul-de-sac* is similarly situated; but directly the street is declared a highway under section 152, they may break openings upon it and enjoy the full rights of light and way. Bridges over a stream, it appears, are premises abutting on to a street. In one case where a man held a strip of land 4 in. wide on which was the fence of the street, he was held to be the owner of premises abutting on to the street; and in another case, where a party was sued whose land was divided from the street by a wall which did not belong to him, he was held not to abut on to the street. It has also been held that the soil of private streets abutting on a new street was land abutting on such street,—but not the soil of public streets. These decisions were under the Metropolis Management Acts; but it has yet to be decided under this Act how the apportionment is to be made for the intersection of cross streets.

Partial Works.—It appears that separate works can be carried out, but they must be apportioned upon the whole of the owners, it being invalid if divided up into sections, according to a ruling under the Metropolis Management Acts; but in a case decided under this Act it was held that the apportionment on the particular owners affected was right.

Sewers.—The Act does not define how the sewer is to be designed and calculated, but probably the principle of the Fulham *v.* Godwin case would apply to a sewer laid in a street under this section, *i.e.*, that the street must be regarded as isolated, and the sufficiency of a sewer determined with respect to the street itself and not to the requirements of the neighbourhood.

Levels.—Under 11 and 12 Vict., c. 63, s. 69, a Local Board had power only to require a street to be levelled with reference to any want of equality or want of uniformity in the street itself. They had no power to require the level of a street to be raised or lowered so as to bring it into uniformity with the adjacent streets. The late Lord Chief Justice Cockburn said:—"Under the words of the 69th section the Board has no power to require the appellant to raise the footpath to the level of the adjoining streets. The object was to make each street uniform, and it must be looked at as one isolated street so far as this question is concerned. If there are inequalities in it, there is power to make it level. It may be that it would be a convenience for the neighbourhood if this street was made of the same level as those near it, but there is no power to throw the expenses of doing so upon the owners."

Deposit of Plans.—It is necessary that these should be on view at all reasonable times while the notices run; but as the provision is directory only, and not a condition precedent to the recovery of expenses, any lax compliance with it will not prejudice the action in recovering the expenses.

Procedure on Default of Owners.—It must be noticed that the Urban Authority have a discretion as to whether they will execute the works or not; but they are not permitted arbitrarily to interfere, and must afford the owner all reasonable opportunity of doing it himself; but if they choose they can arrange with owners to waive the notice and do the work by agreement. In many cases owners often endorse an order on the back of the notices; but it must be borne in mind that this submission does not relieve them from any responsibility as to any wrongful procedure or position on their part. Before proceeding to make a contract, the surveyor should ascertain that all the preliminaries have been rightly

observed. Large sums of money have been lost owing to notices having been invalid, and the Authority are presumed to be in a position to find the money even if they fail in collecting it from the right parties. It is not necessary, however, for the surveyor, before making a contract, to submit an estimate as to future repairs, nor does the omission in any way prejudice the right to recover the amounts apportioned on the several owners.

Apportionment.—This is the last duty almost that the surveyor is called upon to perform, and he must take care that the charges on his form are for the particular works described in the notices served, *i.e.* that each street is treated as a street *per se*; it will not do to lump the costs of a block of streets together, and apportion them amongst the owners of all. An apportionment if requiring to be corrected should be laid again, but a correction by the surveyor after approval by the Authority does not invalidate it. In one case an apportionment had been signed by a surveyor who had ceased to hold office, and it was a nullity, and so treated.

It is usual to add to the total sum expended on the works a charge for superintendence and incidental works. There does not, however, appear to be any authority for this in the Act; but a metropolitan District Board of Works were allowed to recover the costs of obtaining names, advertising, and collecting, &c. A charge is also generally made for interest from demand; this also is not very decided as to who is to settle the amount.

By the time the apportionment is made, very likely blocks of property may have changed hands, and the surveyor must bear in mind that the expenses are a charge upon the premises, and that the party upon whom the notice was served cannot be made to pay if he has ceased to own the property. The direction of the late Lord Chief Justice Cockburn, in the case of Reg. *v.* Swindon Local Board, is very clear upon this point. There is no limitation of time during which to remain effective, and successive owners are liable, until the charges are reimbursed with interest. Yet the owner is personally liable in so far that summary proceedings may be taken against him.

Recovery of Expenses.—This part of the section hardly comes under the surveyor's direction, and more properly is a duty to be performed by the legal adviser to the Authority. The action of section 257 comes in here, and by that it is stated that the owner has a right to appeal and dispute the apportionment for three months after its receipt, and if on the expiration of that time no complaint is made in writing, then the apportionment is binding, and a demand can be made and the money recovered. The ordinary method is to proceed (within six months from the time when the matter of complaint arises) before two justices, who are to decide only upon questions of fact, such as to whether the road is a street, or repairable by the inhabitants at large, as to the liability of the person sued, &c.; but they have no power to deal with or amend the figures, such being the duty of the Authority and of them only; nor have the justices any power of committal in default of distress, as the charge is on the premises, and if they are worthless, then the loss is to the Authority.

Under section 213 the Authority may recover the expenses by levying a rate upon the property in addition to all the other rates, and recover the same from the occupier, and in case the property is unoccupied, then from the owner. In the first instance the Authority must decide which course they will adopt, and it appears that the levying of a rate on the property is not a system to be commended, for the Local Government Board, in a case at Goole, cancelled a decision of the Authority so ordering, and settled that the expenses should be recovered in a summary manner.

Instalments.—In some districts the expenses are not recovered summarily, but sanction is obtained from the Local Government Board to borrow the money required, and spread the repayment over a number of years allowed by them, interest being charged not exceeding five per cent. This is an alternative permission to section 213. Of late years there has been a tendency to reduce the period of repayment very considerably, five years being the outside limit; whereas, formerly, loans have been sanctioned for thirty years, which is absurd, as no work can be guaranteed for that length of time, and if it is necessary to renew the work before the expiration, and the road should have become a highway, the Local Government Board will refuse sanction to a second loan unless the first one is paid off. Therefore the works will have to be paid for out of revenue, or else abandoned altogether.

Arbitration.—If the Authority and the owner agree, the matter can be referred to arbitration under the provisions of the 179th section; but the only question to be considered is the amount to be borne by the defendant owner, and not the question as to expenses being reasonable or properly incurred by the Authority. If an arbitration is held which concerns the whole of the disputing frontagers in a street, the consent of each one to the reference must be obtained, because each has the power to appoint a separate arbitrator, and an award is not binding upon a frontager not a party to the arbitration.

Appeal to the Local Government Board.—By section 268 it is provided that if a frontager feels himself aggrieved by a decision of the Authority with respect to an apportionment, an owner may address an appeal to the Local Government Board, asking them to interfere and inquire into the whole matter, which they have power to do, and their decision is final and binding on all parties. An appeal cannot be made upon receiving notice to do the works, nor on receipt of notice of apportionment, but only after having received a demand from the Authority which may be taken to be their final decision.

Advantage is often taken of this power of appeal, and the Local Government Board have interfered in several cases, but sometimes, owing to informalities on the part of the appellants, they have had no power to adjudicate.

The writer has recently been engaged in a case where it was decided to question the particulars of an apportionment by appeal to the Local Government Board. All the proper procedure was duly observed, and much correspondence took place, but no formal demand had been made for the money. A notice to arbitrate was served by the Authority; and thereupon the owner, taking this as their final decision, addressed a memorial to the Local Government Board, but they decided it was not a decision at which an owner could feel aggrieved, and they declined to intervene. The next step of the Authority was at a meeting of its Finance Committee, when it was decided to summon the owner in the county court; the day after this meeting, a letter to this effect was sent to the owner's solicitors, but no action was taken until the committee's minutes were confirmed by the Authority, and within twenty-one days from that date a fresh memorial was addressed to the Local Government Board, who replied that it was not in time, and should have been sent within twenty-one days from the receipt of the letter giving the decision of the Finance Committee. This decision of the Local Government Board is of the utmost importance, as it has hitherto been considered that minutes of committees were not binding, nor were they decisions of an Authority until the recommendations contained in them had actually been read and confirmed.

This is not necessarily the only method of appeal against a decision of an Urban Authority. A case may be stated and the appeal carried to Quarter Sessions, but the other will be found to be the more satisfactory, and is more beneficial when the ground of complaint is insufficient to obtain a legal remedy, or where such legal remedy if obtained would not satisfy the equity of the matter.*

The Institution of Civil Engineers.—We are asked to state that supplemental meetings for the reading and discussion of papers by students of the Institution have been appointed for the following Friday evenings:—January 7th and 21st, and February 4th and 18th. The papers to be read on these evenings are respectively: "Experiments on Steam-engine Economy," by Edward C. de Fegundo; "The Use of Cast Steel in Locomotive Construction," by Alfred J. Hill; Recent Researches in Friction" (Part II.). by John Goodman, and "Diving, the Apparatus used and Work carried out under Water," by Geo. A. Becks. The chair will be taken at 7·30 p.m. on each evening.

* The remainder in our next.

SHROPSHIRE COUNTY SURVEYORSHIP:

REMINISCENCES OF TELFORD.

By the death of Mr. T. Groves, mentioned under the head of "Obituary" in another column, the office of County Surveyor of Shropshire has become vacant.

At the meeting of the Court of Quarter Sessions on Monday last, the Chairman, Mr. Alfred Salwey, said, with regard to the appointment of Mr. Groves's successor, that it was very important that no time should be lost, and therefore the Court proposed to fill the vacancy on the 15th of January. The office was an exceedingly important one, when they considered that there were eleven lock-ups to look after, the Shirehall and judge's lodgings, and no fewer than 269 bridges. The applications and testimonials would be referred to the Finance Committee.

Mr. C. C. Walker said he had seen the advertisements respecting the county surveyorship, but although the probable salary was mentioned, it was not stated whether the candidate was to be permitted to engage in private practice. This seemed to be necessary to be stated, for the amount of salary named* was too small to attract a first-rate man unless he had private practice, and, as it was not intended to prohibit him from undertaking this, it seemed desirable that it should be known. Before he sat down, perhaps the Court would permit him to state what might not be generally known, and what would probably be interesting. It was a curious thing that just one hundred years ago this very year the county magistrates of Shropshire made an appointment of the county surveyor that was destined to have great historical results in civil engineering, and to leave a mark in our national history. In the year 1787, an excellent young man, named Thomas Telford, who had been a working mason, and the fatherless child of a shepherd, came to Shrewsbury to superintend some alterations at the Castle for Mr. Pulteney, whose residence it was, who was then member for the borough. While there, the county surveyorship fell vacant, and the magistrates appointed Telford to the post. He lived in Shrewsbury, and did much work for the county. He built the county gaol. The benevolent John Howard came there, and by his advice the plans were altered to the approval of the magistrates, and the building made more healthful and humanising to the prisoners. The bust of Howard, which graces the front of the gaol, is in remembrance of this circumstance. Telford did all the usual county work. He built no fewer than forty-two bridges in the county, several of iron,—then a new material for bridges,—and all his work bears the stamp of his genius and ability. The iron bridge at Buildwas is his, and was the third bridge built of iron in England. The magistrates were so satisfied with the performance of his duties that several of them introduced him to make the Ellesmere Canal, and, from the experience which he gained, he made the finest bridges and canals, harbours and docks of that period throughout Great Britain, and so many excellent roads that he became the most eminent road-maker in the world. The Holyhead-road, with the splendid iron suspension bridge over the sea at Menai Straits, the wonder of its day, a beautiful thing always, was the eventual outcome of the experience he gained while faithfully performing his duties as County Surveyor of Shropshire. Indeed, it is not too much to say that, by the confidence in iron for bridge construction inspired by Telford, the progress in civil engineering has been so advanced, and we see the result in those grand iron bridges and viaducts that are made and being made all over the world. There is no appointment that the county magistrates can look upon as made by their predecessors with more satisfaction than the appointment of Telford. Every Shropshire man should read his life. He became not only the first civil engineer of his day, but the first President of the eminent Institution of Civil Engineers, which he held till his death. This distinguished man always remembered what he owed to the magistrates of Shropshire for his introduction to public works. He received many decorations from foreign sovereigns in his long, laborious life, was a great benefactor to his race, and, moreover, to our country. An example to all, and revered by everybody, he now reposes with the illustrious dead in Westminster Abbey.

* 350*l.* See advertisement in last week's *Builder*.

The Chairman said the Court could hardly expect a man to devote the whole of his time to county work for the salary offered; but, according to the conditions of the appointment, the surveyor could not be either directly or indirectly interested in any work by or with the county. That rule would be strictly upheld.

SEWAGE IRRIGATION FOR SMALL AREAS.

ASSOCIATION OF PUBLIC SANITARY INSPECTORS.

On New Year's Day, Mr. Jas. Bateman, of Pewsey, Wilts, read a paper before this Association on the application of sewage to cultivation. Mr. Jerram, the Chairman of the Council, presided, and there was a fairly numerous attendance of members. Schemes for dealing with the drainage of large towns, said the lecturer, were numerous, but they were often absent in overgrown villages and small towns in England having a population of 2,000 or 3,000 persons, but not coming under the provisions of the Local Act. In such cases he believed the remedy must be sought in sewage irrigation. In assuming a population of between 2,000 and 3,000, where the water supply depended on wells or the private storage of rain-water, and situate within easy distance of a watercourse,—he had in mind several localities in Wiltshire where the conditions exactly applied,—the sewage would contain, not manufacturing refuse, but the drainage of closets, baths, sinks, washhouses, tanyards, slaughter-houses, brewhouses, and such refuse as was always left in market-places where horses, cattle, pigs, and other animals were offered for sale. Allowing for moderate rainfall, and a water consumption of twenty gallons per head of population, he calculated that the discharge of 105,000 gallons every twenty-four hours would have to be provided for, and allowing for a prospective increase of population, the sewers leading to the deposit tanks should have a sectional area of 18 in. by 27 in. In the working out of irrigation schemes in such districts, the most burdensome condition was the high standard of purity fixed for the resulting effluent by the Rivers Pollution Act, which required that no "liquid containing in suspension more than three parts by weight of dry mineral matter, or one part by weight of dry organic matter in 100,000 parts, shall be admitted to any stream; or which shall exhibit by daylight a distinct colour when a stratum of it 1 in. deep is placed in a white porcelain or earthenware vessel." This condition was absolute, and must be complied with, and where the soil was not on the one hand a too heavy clay or on the other a too porous or loose one, the condition could be fulfilled. A soil well adapted to the purpose, varying from a light to a stiffish loam, could almost always be found adjacent to a stream, and with proper under-draining and due discrimination in the application of the sewage to the land, highly satisfactory results might be reckoned upon. The public mind had been much prejudiced against irrigation schemes by the absence, in such schemes, of efficient subsoil drainage, the results in those cases being often the creation of a sewage marsh in winter, or in summer of a pestilential hot-bed. As had been pointed out by Sir Robt. Rawlinson, no hard-and-fast rule could be laid down. A system which answered admirably in one area might fail in another. Everything would depend upon good management. At Doncaster, some 600,000 gallons of sewage per day were distributed over an area of only from two to five acres, without swamping it, the weight pumped upon it reaching the enormous amount of 2,700 tons of sewage daily. On another point he agreed with Sir Robt. Rawlinson, "that tanks could not properly filter sewage." They only acted as storage places for subsequent mechanical or chemical treatment. The most important consideration was the expense to the ratepayers of all such schemes. Assuming the cost of a scheme like that he had outlined to be 3,000*l*., which, borrowed at three per cent. for thirty years, would involve for interest and repayment of principal a charge of 190*l*. for the first year (diminishing every year), a cess of 10½d. per head of the population for the first year would suffice. This *per capita* plan the lecturer considered better than charging by assessment on rateable value. In conclusion, Mr. Bateman, maintained that while the welfare of the larger communities was being well looked after, the smaller ones were being neglected. The operation of the Sanitary Acts was very slow in rural districts, and obstacles were often placed in the way of their administration; but it must commend itself to the mind of any one who studied the question that Nature had placed many of our towns in such a position that very little was required by man to reduce the standard of mortality below its present average, and the authorities that best endeavoured to carry out this great humanitarian principle were the authorities who might be said to be the pioneers of a better age.

In the discussion which followed, the Chairman, Mr. Middleweek, Mr. Dee, Mr. Clarke, and Mr. Easton took part, the general opinion being in favour of water-carriage and irrigation in the disposal of sewage in localities such as those dealt with in the paper, as against the pail or earth-closet system.

A cordial vote of thanks was accorded to Mr. Bateman.

The Chairman announced that the annual dinner of the Association would be held on the first Saturday in February.

ROYAL ACADEMY.

ADMISSIONS TO THE ARCHITECTURAL SCHOOL.

Upper School.

Alford, W.	Newberry, J. E.
Ambler, L.	Schultz, W. R.
Ayling, R. S.	

Lower School.

Blomfield, A. C.	Lancbester, H. P.
Bryden, R.	Oliver, J. P.
Fletcher, B. F.	Page, V. R.
Gregg, H. A.	

Probationers.

Baker, H.	Matthewman, H.
Collins, G. E.	Neal, H. G.
Draper, R. E.	Norton, C. H.
Fetch, E. E.	Poole, E. E.
Giles, A. L.	Powell, A. H.
Grace, W.	Pywell, A.
Horton, W. F.	Sampson, R. W.
Inman, A. J.	Taylor, W.
Jaques, G. R.	Thompson, A. H.
Martin, C.	Verity, F. T.

THE NATIONAL AGRICULTURAL HALL, KENSINGTON:

THE STABLES OF "OLYMPIA."

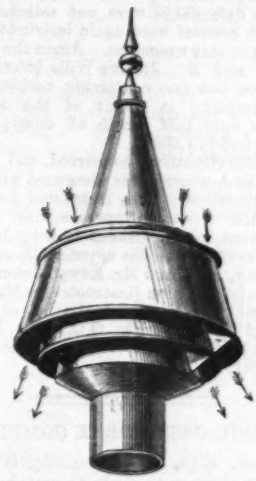
This immense building was opened on Boxing Day. It is not necessary here to describe the structure, inasmuch as we have on previous occasions done so very fully.* The architect was, in the first instance, the late Mr. H. E. Coe, who was succeeded by Mr. James Edmeston. The ironwork of roof and columns was designed by Messrs. Max am Ende & A. T. Walmisley, and erected by Messrs. Handyside & Co., of Derby, and the glazing and zinc work of roofs and flats has been done by Messrs. T. & W. Helliwell, of Brighouse, on their patent systems. The general contractors were Messrs. Lucas Bros., of Kensington, whose contract amounted to upwards of 130,000*l*.

The stables for the large number of horses accommodated present some noteworthy features. The whole of the fittings were supplied by the St. Pancras Ironwork Company. It was necessary to have the divisions of the stalls readily removable, in order to make room at a future time for dog shows, &c., and they were also to be changeable into loose boxes, required for shows of thoroughbred and other valuable horses. At the same time the stall divisions had necessarily to be firm and strong. These requirements have, we are informed, been satisfactorily fulfilled without the aid of bolts and nuts, which, when left for some time, are apt to set fast. All the divisions and posts were made to one set of templates, and are interchangeable, and all the moving parts are formed in brass carefully turned. Accuracy of work was essential, as a difference of thickness hardly perceptible with ordinary callipers would throw the posts out of upright to a very evident extent. About 150 stalls in addition to loose box and other fittings were modelled, made specially and fixed complete at a moderate cost in the short space of six weeks, a feat requiring much resource and energy. Some of the stalls are made small on purpose for ponies, and in addition there is a series of permanent loose boxes, and a large harness-room fitted with strong portable standards and ornamental japanned brackets to suit the numerous saddles and driving harness.

* See *Builder* for Oct. 3, 1885, and for May 29, 1886.

BOYLE'S PATENT VERTICAL CURRENT EXHAUST VENTILATOR.

This ventilator, which is made by Messrs. Robert Boyle & Son, Limited, of 64, Holborn Viaduct, is a modification of the latest improved form of Boyle's patent (1882) self-acting air-pump ventilator, and is intended to utilise a descending current of the external air to create an up-draught or exhaust, the wind passing downwards over the deflecting plates, which are placed horizontally instead of vertically, as in the ordinary form of the air-pump ventilator.



This form of ventilator, an illustration of which we here give, is intended to be fixed on the roofs of buildings which are surrounded or overtopped by higher buildings, when it is not found expedient to carry up a shaft to the top of the higher building.

OBITUARY.

Mr. T. Groves.—The death is announced of Mr. T. Groves, the County Surveyor of Shropshire. He was appointed to the office in 1866. As is mentioned in another column, the appointment was once held by the distinguished engineer, Thomas Telford.

Mr. James Horsford, formerly Borough Surveyor of Bedford, died on the 24th ult., in his 81st year.

Mr. M. Davis.—Mr. Maurice Davis, a well-known builder in the West of England, carrying on business at Langport, recently died very suddenly at Ashford, in Kent, where he had retired only a fortnight previously. He had been engaged in the restoration of upwards of seventy churches in Somerset, Dorset, and Devon, work for which (according to an architect who knew him for thirty years) he was peculiarly qualified, as he possessed a good knowledge of archæology.

M. Dirks.—The Brussels correspondent of the *Times* announces the death of M. Dirks, principal engineer of the Waterstaat, in Holland, and formerly a member of the Dutch Chamber. He was one of the first authorities in Europe on harbour and canal construction.

"Jubilee" Projects.—It would be interesting to see a tabulated list of all the suggestions which have been made for keeping the Queen's Jubilee. What may be called the Jubilee Year is already setting in with considerable intensity, not only in large cities, but in towns and even villages, and it is curious to note the variety of proposals which have been put forward, embracing well-nigh every conceivable project, from a system of complete drainage to a people's park, and from an almshouse to a public baths and washhouses. At some enterprising towns they are not content with one or even two projects. At Bridgewater, for instance, the scheme includes a park, some public baths, a chain of office for the mayor, and a statue of Admiral Robert Blake. At Brighton, Alderman Abbey suggests a plan which will transform the Western Lawn of the Pavilion into a winter garden by roofing it in at a considerable height with glass. At another town it is positively proposed to celebrate the auspicious occasion by the exceedingly prosaic plan of laying down a wooden pavement.—*Sussex Daily News.*

A CONTRACTOR'S CLAIM.

WOOD v. THE TENDRING UNION SANITARY AUTHORITY.

ON December 16th last, Mr. Justice Wills and Mr. Justice Grantham gave what may prove to be the final decision in this case. They decided that the Guardians of the Poor of the Tendring Union were wrong in law as well as in morality in endeavouring to deprive Mr. Wood, the contractor for the Clacton-on-Sea sewerage, of the money earned by him and agreed to be paid to him for the construction of the sewers.

The legal advisers of the Tendring Union at once decided to appeal against this decision, and instructed their counsel to apply to the Court to stay execution under the judgment until the appeal would be heard. This, however, the Court declined to do, pointing out that in their opinion the case was perfectly clear, and that there was no ground for appeal.

Still the defendants were not satisfied, and on the 21st ult. counsel were again instructed to make application to stay execution. Again they were unsuccessful, and Mr. Justice Wills informed them that the case was one containing nothing to move judicial sympathy in favour of the defendants. There was only 168*l.* worth of delay, and they claimed to forfeit 1,000*l.*

Mr. Justice Grantham concurred, and the application of the Authority was dismissed with costs.

Their counsel were then instructed forthwith to appeal to the Court of Appeal against their decision; but that Court, without hearing Mr. Wood's counsel, also dismissed the appeal with costs.

Mr. Finlay, Q.C., and Mr. Edwyn Jones appeared for the Tendring Union (instructed by Mr. Oldman, London agent for Mr. R. J. Daniel, of Manningtree); and Mr. Philbrick, Q.C., and Mr. J. F. Bottomley Firth for Mr. Wood (instructed by Mr. Wm. Tanner, of Chelmsford).

LIVERPOOL CATHEDRAL COMPETITION.

SIR,—Mr. Ellis, while thinking it advisable during my absence to reply to certain remarks, which called forth a rejoinder in your journal, was evidently quite unaware of my letter to the editor of the *Builder*, quoted in last week's issue [p. 5].

The explanation is simple, and is, that the representative of another journal first called at my office, and, with my permission, made his selection of those drawings he preferred to publish, and that without my expressing any wish on the subject, or influencing him in any way whatever in his choice.

I imagine he chose what he thought best, and after his selection was made (to which I had no manner of objection, seeing that I also consider the alternative plan B my best general arrangement) the letter quoted was written to the *Builder* to ensure the illustrations appearing in the various papers agreeing with each other. You were, therefore, correct from your point of view in saying I had selected the drawings you published.

That I did not mind this alternative arrangement being published goes without saying, for it requires no vindication on my part.

By plan A, I had absolutely complied with the clause in the instructions to which reference has been made, viz., "to provide for the erection of a cathedral church on such a scale as the site will admit."

And in submitting plan B I maintain that I was warranted by the intention, as it seemed to me, of the continuation of the same clause of the instructions, which has hitherto been unmentioned publicly, viz., "having regard to convenient approaches and accesses, the proximity of St. George's Hall, and other buildings," in making a suggestion in which I endeavoured to the best of my ability to duly consider how the present approaches and accesses could be improved, to which point this clause called our special attention, and this is the reason of the introduction of the flight of steps at the west end, the principal variation in the plan.

The extra bay suggested in this plan I do not consider a necessity, and it is so stated in my report, and no other drawings show it, either in elevation or section, nor does it make any difference whatever to the general tenour of the design, as is clear from the largest perspective, which shows the plan A exactly fitting the site, and with no alteration to the approaches.*

Mr. Christian says in his report,—"The plan B, No. 2, which I take to be legitimate as a suggestion, shows a somewhat ambitious scheme for combining with the erection of the cathedral a much-needed municipal improvement, in the formation of a high-level road from Dale-street, past the cathedral and the important buildings to the northward of the site, and leading onwards to St. George's Hall and the London and North-Western Railway Station. In this plan the cathedral is shown as elongated by one bay of the nave, placing it that much nearer to St. George's Hall, and at the western end by projecting a large flight of steps into the old Haymarket, occupying the space, at present but little used, at the side of the main roadway of traffic. By this plan the level of William Brown-street would be lifted, and fine space given in front of the public buildings; but the descent to the main arteries of communication on the lower level would have to be diverted, as to the possibilities of which I am unable to judge." And this, with the exception of stating further on in the report, "that he is by no means certain that the steps shown in the large perspective drawing, and which, under the present circumstances of the site, could not be had, would not be better omitted," is the sole reference he makes to this alternative plan; it is, therefore, certain he did not base his report on it.

WM. EMERSON.

January 4, 1887.

* The print published of this large general view is copied from the only lithograph I had done, it being an expensive process, and was taken with a slip over the foreground to show the alternative arrangement of the high-level approach.

SANITARY INSTITUTE OF GREAT BRITAIN EXAMINATIONS.

SIR,—Most notable amongst existing sanitary examinations is that held by the Sanitary Institute of Great Britain for Local Surveyors and Inspectors of Nuisances, concerning which, with your permission, I wish to make a few brief remarks.

The constitution of the Examining Board in connexion with this Institute is sufficient indication of the high-class nature of the examination, and a perusal of the actual questions of past examinations will dispel any doubts as to its practical and useful nature. Whilst, therefore, fully acknowledging its value, as also the obligations which the profession, and especially the younger members thereof, owe to the Sanitary Institute, I nevertheless desire to point to an important defect, not in the nature and scope of the examination, but in the mode of rewarding successful candidates.

To all such, a certificate of "competency to perform the duties of a local (sanitary) surveyor" is awarded, the result of which is that any young man, in his teens or otherwise, who possesses, as evidenced solely by his answers to a given number of questions, a fair knowledge of municipal law and of sanitary engineering, as extracted from books, is declared by a semi-official body of great repute to be capable, in their opinion, of performing all the duties of a local surveyor, notwithstanding the absence of proof, or may be with proof to the contrary, of even a day's experience in the actual work of a surveyor's office.

Possibly though "competent" he may be unable to use a level or theodolite, make a survey or get out a drawing, may never have seen a sewer laid, nor appreciate the importance of "grit" in mortar. Concerning also the multitude of important questions daily arising in a Sanitary Surveyor's practice, which are not, nor well could be, included in the scope of an examination, but for the solution of which a Sanitary Authority looks to its chief surveyor, a certificated "local surveyor" may have no knowledge.

In view of this possible absence of necessary information under the existing arrangements, it would obviously appear, as a remedy thereto, that the awarding of certificates drawn up in such comprehensive terms, and intended to serve as an inducement to Sanitary Authorities in their choice of a surveyor, should only be consequent upon the fulfilment of certain other conditions by the candidates, viz.:—That they shall have had a certain number of years (say five) previous experience in the office of a general engineer and surveyor, or, better still, of a municipal or local surveyor, the absence of such experience, though not necessarily preventing the candidate's sitting for examination, to preclude the granting of a certificate until after the expiration of the period of probation.

The value and prestige of the examination would thus be greatly enhanced, the reputation of the Sanitary Institute as an examining body greatly increased, and the confidence of Local Authorities in "diplomas" much strengthened, since the condition imposed would prevent young and inexperienced fledglings hawking their certificates from place to place in their efforts to obtain an appointment, the which, in the absence of practical experience, despite guaranteed "competency," a Sanitary Authority, if well advised, refuses to confer.

J. A. A.

THE NEW AMERICAN CHURCH, PARIS.

SIR,—In your last excellent edition of the *Builder*, with its accompanying drawings, representing, amongst others, the above building, you observe that the church has been much admired; and its chaste appearance affords little room, certainly, for criticism. Architecturally, there is one feature apparently noteworthy,—namely, the alternation of size in the nave columns. So far as can be discerned by the drawings, no constructional reason demands the variation to the extent shown; the small columns carry almost as much as the large ones, assuming that the weight of the roof and vaulting is equally distributed on each.

Of course, taking the small columns as representing the true requirement of the building, it is obvious that artistic reasons, *pur et simple*, may have determined the size of the large ones. Artistically, is the combination a happy one? Do not the large columns give an appearance of weakness to the small ones? Some time since interest became excited regarding this building, consequent on the reported defection of several of the columns when fully weighted.

The late Mr. G. E. Street, as is known, with somewhat rare discrimination, dwelt much on the need of massiveness in excess of the measure of economic construction;—in other words, he studied *durability* as well as erection, a matter nearly ignored in many modern erections,—it is somewhat strange, therefore, to hear of weakness in his work.

Mr. A. E. Street, having placed the design under public notice, would benefit your readers generally by stating the result of his experience in this matter, especially if he gave, in general terms, the principle upon which the weight is distributed on the nave columns, and their proportionate strength; also the influences traced as causative of the defection therein. Remedial measures, in a case like this, are costly, and future mishaps may be avoided by a clear enunciation of the difficulties laboured under at the Avenue de l'Alma.—Yours truly,

DAVID WALKER.

Cowes, Isle of Wight, January 4th, 1887.

GREAT NORTHERN HOSPITAL.

SIR,—Being one of many other architects interested in hospital buildings, and a non-competitor, I availed myself of the opportunity to examine the drawings submitted in a limited competition for this new building at the time they were open to public inspection.

In comparing the plan as published in the *Builder* of Dec. 25 with the competitive design, it appears evident that the principle of circular *versus* rectangular wards has in the modified plan been almost entirely ignored.

I was informed at the time they were on view that it was purely a question of principle which induced the governors to award to Messrs. Young & Hall the first prize. Why, therefore, the abandonment of this most important point? In the original plan three circular wards were shown, in the modified and adopted one only one circular ward is to be erected when funds are available for the purpose.

I hardly think this course of procedure is quite fair to the other competitors.

ARTH. ARDRON.

"FRED." AND "ALF."*

SIR,—I am much obliged for your notice of my new book, "Ornamental Interiors," but should like to correct the impression given in your review that I have treated the names of contributors somewhat flippantly.

In the few cases where such contractions as "Fred." and "Alf." occur, the names are given exactly as these gentlemen sign themselves in their business communications, and I fancy it would be discourteous to expand or contract their signatures. The owner of a name has often a good reason for a peculiarity of signature which is not apparent to one outside his family circle.

I have found by experience that it is hazardous to attempt to expand contracted names. "Fred." may refer to "Alfred" and not to "Frederick";

* *Vide* "Books" review in last issue.

"Alf." may be "Alfric" and not "Alfred." Once I described a correspondent who signed "Hy." as "Henry"; he wrote to implore me to print a correction, as he was christened "Harry," and would not be recognised under the name I had given him.

J. MOYR SMITH.

DANGEROUS PLASTER CEILINGS.

SIR,—My evidence in the case reported in the *Builder* of the 1st inst. [p. 63] appears to have been misunderstood in one particular.

I stated that the specimen which I exhibited weighed 9½ oz.; not that this was the weight per superficial foot. I calculated that a foot of such plaster would weigh 7 lb. at least, and that a piece measuring a superficial yard (which was less than was stated in evidence to have fallen) would weigh upwards of half a hundredweight.

THOS. BLASHILL,
District Surveyor of West Hampstead.
3, *Blackburn road, West Hampstead,*
January 5th, 1887.

Books.

Specifications for a Frame or Brick Building, costing from $1,000 *to* $10,000. Copyright. New York: Palliser, Palliser, & Co. London: Trübner & Co. 1886.

THE law-stationers' shop-windows have familiarised us with a certain class of eviscerated legal instruments,—wills of anonymous testators who demise unspecified properties to unnamed recipients; forms in which the only really interesting matter is, like Viola's history, "a blank." American enterprise has adopted the hint and applied it to architecture instead of,—or rather perhaps as well as,—to law. A sample "Specifications for a —— to be erected for —— at ——, —— architect" (published by Palliser, Palliser, & Co., New York), is before us, and is a somewhat curious document. It will be observed that the nature of the building even is not disclosed,—whether a town house, a country house, or indeed whether it is a dwelling-house of any kind. It is simply a "Frame OR Brick Building." The desire to be comprehensive enough to suit many customers has naturally resulted in vagueness, and the document in question fails in the first requisite of a specification, inasmuch as it is not specific. Under some headings, indeed, the work is described in considerable detail; but under such as "iron-work," "cut stone work," and a multitude of others not a word is said. It is too full for the purpose of a mere *aide-mémoire* for the professional architect, and too fragmentary and incomplete to serve as a guide to the amateur.

The order of the trades is not our order,—the slater, for instance, coming after the painter, a sequence which it is difficult to harmonise with any rational system of building. General conditions precede each trade, and would appear to point to the Scottish plan of letting each trade separately. There are, as may be supposed, many novel phrases, all terse and expressive, although not many novel processes, and some variations on the traditional nomenclature; a gas-fitter, for instance, appearing as a gas-piper, and bringing a spice of humour into a literature which seldom errs in that direction.

On the whole, we should be inclined to think that this document has not been framed by a professional architect,—who would surely have had something to say under the forty-four (or more) headings which are followed by blanks,—but by a "literary ignoramus" who has had access to a collection of chance materials the supply of which, for some trades, has run short.

The whole is neatly bound in grey covers, which are used as the medium of advertisements for building materials and appliances; and although this specification will not supersede the necessity for the services of an architect, any more than similar legal forms have left the lawyers unemployed, it may prove useful to builders in outlying districts where architects are not at hand.

Hints on Woodcarving, for Beginners. By ELEANOR ROWE; with a Preface by T. H. POLLEN.

THIS little book, by the Manager of the School of Art Wood Carving at the City and Guilds Institute, and apparently issued by the said school, is a short and very practical treatise, commencing with information as to the tools used in woodcarving and the methods of using them, with a passing sarcasm on "glass paper and files," and a recommendation (in which we entirely concur) to aim at a sharp and steady cut from the first. Six lessons are given for the amateur to start with, illustrated by large cuts, with descriptions of the method of going to work to produce the various modellings. The designs given serve the practical purpose. They might, however, have been a little more artistic, and not quite so commonplace.

Sculpture: Renaissance and Modern. By LEADER SCOTT. London: Sampson Low & Co. 1886.

THIS is one of the series of "Illustrated Handbooks of Art History" of which we have noticed some previous issues on other branches of art. It gives a concise sketch of sculpture from the thirteenth century to the present day; a good deal of attention being bestowed on the early Florentine sculptors, in treating of whom the author recognises fully the eminently sculpturesque genius of Donatello, as opposed to the pictorial treatment of the art by Ghiberti. In the illustrations of the subject of the Sacrifice of Isaac, as treated by Brunellesco and Ghiberti, we observe the titles have been transposed, and the design of Ghiberti is assigned to Brunellesco, and *vice versâ*. The book may be recommended as a useful compendium of its subject, marked by good critical taste, though somewhat dry in style. It is, however, a very good shilling's-worth of information and illustration.

The Industrial Self-Instructor and Technical Journal: containing Instruction in the Leading Branches of Technical Science and Industrial Arts and Processes. Vol. II. London and New York: Ward, Lock, & Co.

THIS is one of those *omnium gatherum* books which are supposed to be "useful presents for boys," and which contain a little information about an immense number of heterogeneous subjects. We can hardly see that much good is done by this type of publication, except so far as that a young reader's interest in some subject may be so far stimulated that he may wish for more and fuller information. The practical portions of the book seem to be the best; the artistic suggestions and examples are very bad.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

1,243, Bricks, Tiles, and Furnace Linings. A. Fould and P. Geneau.

This invention consists in using two substances chemically antagonistic to each other, but fused by means of a third substance introduced. These materials are dried and baked as in ordinary brick-making. The chief claim is the use of special "agglomerants," whereby refractory substances are brought into a plastic condition and moulded. The said substances will afterwards resist great heat.

1,282, Securing Door Knobs, &c. J. B. O'Callaghan.

According to this invention a small nut turns on the spindle being moved thereon by working a bradawl or similar tool in a hole made to receive it. This nut draws up the knob to its proper position on the spindle.

1,349, Gas-fittings. H. Harper.

This invention consists of a sliding lever so arranged that when lifted it releases the globe, and when pulled downwards in a perpendicular direction the globe is held fast.

1,372, Domestic Stoves. J. S. Watson and H. S. Morwood.

This invention relates more particularly to grates and fireplaces of a portable character, and consists in the construction of a canopied dog-grate and hot-air stove combined of a portable or semi-portable character, which may be used as a domestic fireplace for heating and ventilating.

1,711, Economy of Fuel, &c. R. W. Hewett.

By this invention a bellows or fan exhauster is so fixed that when worked a vacuum is created, and hot air or gases caused to pass through the fuel.

15,830, Apparatus for Teaching Drawing. J. H. Russell.

This invention consists essentially in the combination, by means of suitable ties and connexions in metal, of diagrams in metal or rigid material, representing plans, elevations, and sections of a similarly-made model in outline of the solid object from which the said plans, elevations, and sections are taken. Wires are sometimes used, or different lines of colour to denote the different parts as combined one with another.

1,803, Lining, &c., in Painting. T. Heighway and J. Smithies.

This invention consists in arranging movable templates, not unlike parallel-rulers, which thus allow of any thickness of line, which is generally stencilled in the ordinary way. The framework can be utilised for holding ordinary work in lieu of pins.

10,829, Scoria Paving Blocks. C. J. Dobbs.

To prevent the slipperiness usually experienced with blocks made of furnace-slag, they are cast in larger moulds and broken to pieces by a blow, when the fractured surface is used as the wearing part and the slippery skin which forms on the mould is turned inwards.

NEW APPLICATIONS FOR PATENTS.

Dec. 24.—16,896, J. Fagan, Cisterns for Water-closets.—16,911, J. Hunter, Sign-boards.—16,920, H. Bright, Water-meters.—16,922, E. Clarke, Brickettes.—16,926, E. Bronson, Compounds for Coating and Finishing Walls.

Dec. 28.—16,945, C. Swindell, Stove Grates, and Fireplaces.—16,956, W. Stevens, Ventilating and Flushing Water-closets.—16,997, A. Deslandes, Automatic Door Curtain-raiser and Draught-preventer.—17,013, J. Alston, Flushing Cisterns for Water-closets, &c.—17,016, O. Flagstad, Window Construction.

Dec. 29.—17,019, G. Henley, Building Hollow Walls.—17,055, J. Tall, Facing for Concrete Structures, &c.

Dec. 30.—17,098, W. Sonnett, Manufacture of Portland Cement.

PROVISIONAL SPECIFICATIONS ACCEPTED.

10,055, A. Andrews, Window and Door Fasteners.—11,453, W. Fox, Joiners' Braces.—14,448, H. Johnson, Lock-bolt for Doors and Windows.—14,602, E. Hedgman and F. Villiers-Stead, Automatic Self-replacing Indicators for Electric Bells.—14,972, T. Fawcett, Machinery for Pressing Bricks, Tiles, &c.—15,170, M. Crofton, Ventilator and Manhole for Buildings.—15,184, G. Stierlin, Fanlights, Windows, Ventilators, &c.—15,962, S. and S. R. Chatwood, Locks.—16,171, S. Hazeland, Machinery for Planing Wood.—16,312, W. Illingworth, Joiner's Adjustable Bench Stop.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

1,126, C. Alison, Cements or Plasters.—2,419, J. Hicken, Fixing Door-handles, &c., to Spindles.—3,195, F. Harrison, Barrel Bolts for Doors, &c.—3,388, H. Dempewulf, Smoke-consuming Fireplaces.—4,103, R. Elliott, Apparatus for Setting the Teeth of Saws.—4,288, J. Walker and H. Worsey, Sash, Casement, and Door Fasteners.—12,109, R. Price, Electrical Drop Indicator.

Society of Arts.—The following are included in the arrangements made for the meetings of this Society for the present session. *Ordinary Meetings* (Wednesday evenings, at eight o'clock):—January 19, "Cameo Cutting as an Occupation," by J. B. Marsh; February 2, "Electric Locomotion," by A. Reckenzaun; February 16, "Handicraft Training," by Henry H. Cunynghame. Amongst the papers for which dates will be hereafter announced are:—"Miners' Safety Lamps," by Edward H. Liveing; "Machinery and Appliances used on the Stage," by Percy Fitzgerald; "Irish Industries," by the Rev. Canon Bagot; "Progress in Telegraphy," by William Henry Preece, F.R.S.; "Railway Brakes," by William P. Marshall; "The Living Organisms of the Air: the effect of Place and Climate on their Prevalence," by Dr. Percy Frankland. *Indian Section* (Friday evenings, at eight o'clock):—February 11, "The Economical Condition of India," by Dr. Watt, C.I.E.; March 4, "Our Trade Routes to the East," by Major-General Sir F. J. Goldsmid, K.C.S.I., C.B.; April 29, "Village Communities in India," by J. F. Hewitt. *Applied Art Section* (Tuesday evenings, at eight o'clock):—Feb. 1, opening address on "The Present Condition of Applied Art in England, and the Education of the Art Workman," by T. Armstrong, Director of the Art Division, Science and Art Department; February 22, "Wrought Ironwork," by J. Starkie Gardner, F.G.S.; March 15, "The Application of Gems to the Art of the Goldsmith," by Alfred Phillips; April 26, "Ornamental Glass," by J. Hungerford Pollen; May 24, "The Importance of the Applied Arts and their Relation to Common Life," by Walter Crane.

Professional Partnership.—Mr. T. Thornton Green, surveyor, Poultry, announces that he has taken into partnership Mr. P. Pietersen, who has for some years past been associated with him as principal assistant. The style of the firm will be "T. Thornton Green & Pietersen."

—THE VERNIER—

FIG 1

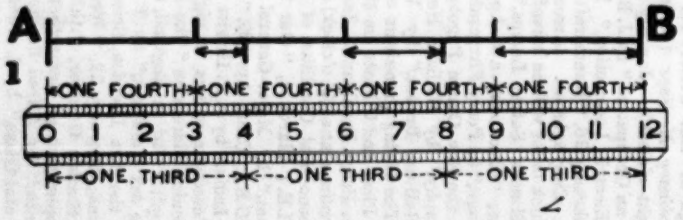


FIG 2

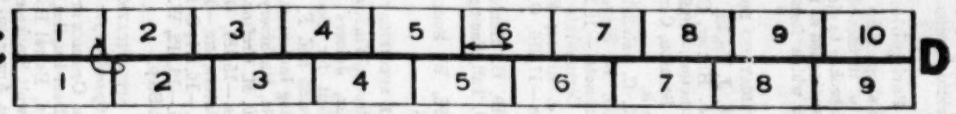


FIG 3

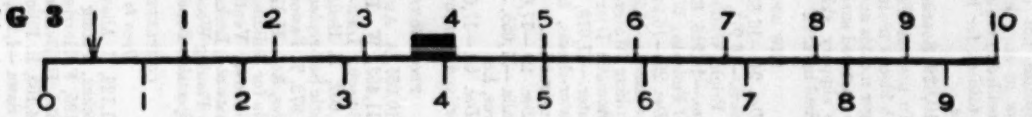


FIG 4

FIG 5

FIG 6

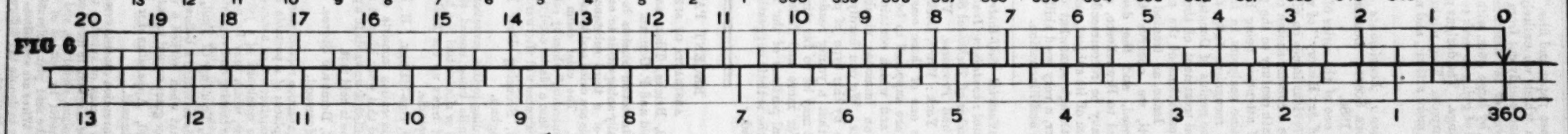


FIG 7

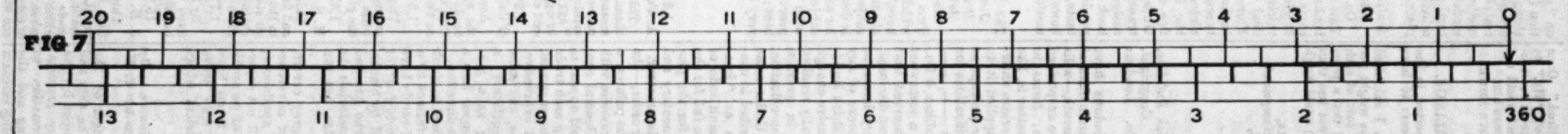
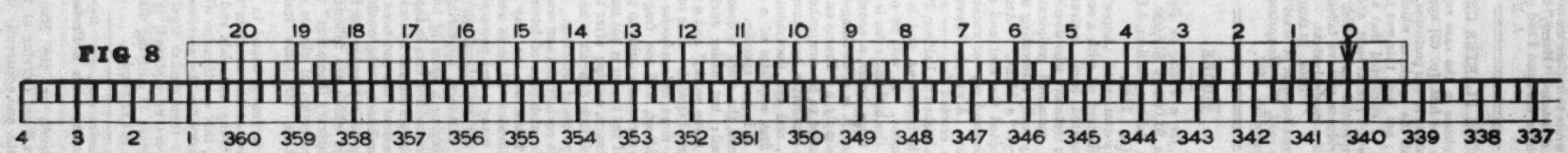


FIG 8



The Student's Column.

FIELD WORK AND INSTRUMENTS.—II.

Surveying Instruments.

II.—THE VERNIER.

BEFORE proceeding to describe instruments which measure fractional proportions of given lengths, it is necessary clearly to understand the principal of a vernier.

The vernier scale is made to slide evenly along the graduated limb of an instrument, and is constructed of a total length consisting of a number of divisions of the primary scale, less by one than the number of smaller divisions into which those primary divisions are to be subdivided. By its use, distances or amounts of deviation, can be minutely measured with a degree of accuracy unattainable with the application of a single scale closely subdivided, as in the latter case the strokes indicating the divisions would come so near together that it would be difficult to distinguish one from the other, even when read through a powerful lens. The principle may be thus stated: If a line be divided into m number of equal parts on one side, and into $(m + 1)$ number of equal parts on the other side, the length occupied by the difference between each of these divisions will be equal to the length of the line divided by the product of the number of parts taken on each side, or mathematically expressed by the fraction $\frac{1}{m(m+1)}$; thus in figure 1, the line AB being divided into three and four equal parts, the difference between these parts equals $\frac{1}{3\times4}$ or one-twelfth ($m=3$, $m+1=4$ and $\frac{1}{m(m+1)} = \frac{1}{12}$). This will be evident upon reference to the foot-scale shown under the line AB. If the line AB be supposed to be 12 in. long, the difference between one-third and one-fourth is one-twelfth, or 1 in., the difference between two-thirds and two-fourths is two-twelfths, or 2 in.; and the difference between three-thirds and three-fourths is one-fourth, or 3 in. Applying this principle to fig. 2, we obtain by dividing the line CD into nine and ten equal parts respectively, a length between these divisions equal to $\frac{1}{90}$ of the whole line. Now if the upper line of divisions be supposed to represent the vernier, and the zero point indicated by the arrow in fig. 3 be moved forward so that the line at 5 upon the upper scale coincides with a line or stroke upon the lower scale, then the arrow will have travelled $\frac{5}{90}$ of the whole length of CD along its edge from the zero upon the lower scale of divisions, or half way from the zero towards the next division upon the primary scale.

The limbs so graduated may be either straight or circular. In circular instruments which record angles, the primary scale is graduated into degrees, each degree of the circle being sub-divided into two or three equal parts, denoting 30 or 20 minutes respectively, while the introduction of a vernier will enable this scale or division to be read to minutes or such parts of minutes as may be required. For instance, let us suppose, as shown in fig. 4, that we have to deal with an instrument in which the primary scale is divided into degrees, and half-degrees, and that we desire to construct a vernier which shall enable us to read to minutes. One minute being a thirtieth part of each subdivision of the primary scale, we must take 29 divisions on this scale, and divide it into 30 equal parts upon the vernier. Thus, if $m+1=30$, $m=29$, and the product $\frac{1}{m(m+1)} = \frac{1}{29\times30} = \frac{1}{870}$ of the whole length of 29 divisions so taken; but as each of these divisions is equal to half a degree, we have $\frac{1}{870}\times\frac{29}{2} = \frac{1}{60}$ of a degree as the result of the division obtained by the vernier: hence the vernier will read to minutes. It will be observed, in figs. 4 to 8, that the numbering upon both the primary and the vernier scales reads from right to left. This is because the two scales in circular instruments are placed upon a circle situated at or near the outer edge, and the instrument is worked round with the sun from the centre of that circle. Circular protractors and theodolites are thus constructed, but in the box sextant, as will be seen by our next article, the numbering reads from left to right.

Fig. 5 shows the same vernier as fig. 4, but with the zero point in the centre. This arrangement is adopted by some makers in the manufacture of their circular protractors, which we shall hereafter describe. The divisions are the same as in fig. 4, but the right-hand half of the vernier, numbered 15 to 0, is placed upon the left-hand side of the half numbered 30 to 15. To understand this better, we may compare it to a foot rule or split-divided scale, in which the inches are marked 6 to 12, and then 1 to 6, instead of 1 to 12, as is usually done. In Figure 6 the primary scale consists of degrees and thirds of a degree, and a vernier is constructed reading to 30 seconds: thus a length of 39 divisions on the primary scale is divided into 40 equal parts upon the vernier' 30 seconds being one-fortieth part of a subdivision on the primary scale, each of which subdivisions equals 20 minutes. Here $m+1=40$, $m=39$, and $\frac{1}{m(m+1)} = \frac{1}{39\times40} = \frac{1}{1560}$ of the whole length of 39 divisions, equal to 13 degrees, or 780 minutes, hence $\left(\frac{1}{39}-\frac{1}{40}\right) = \frac{1}{1560}\times\frac{13\times60}{1}$ $= \frac{1}{2}$ minute, In order to read the minutes correctly upon the vernier, every alternate division only is numbered, the intermediate divisions, which are made shorter, for sake of clearness, indicating half-minutes. In our diagram the curved graduated limbs are shown developed into horizontal or straight members. The curved lines, however, in practice, are omitted by the best makers, and the strokes indicating the divisions are carefully cut and numbered upon the circular plates at the works by a machine, so fixed as to reduce them from a large pattern, upon which the figures and lines have been accurately set out.

Fig. 7 indicates the same primary scale of divisions and the same vernier as in fig. 6; but in fig. 7 the arrow at the zero point has travelled forward a certain proportion of the full subdivision of one-third of a degree on the primary scale. Now, the vernier enables us to see that this amount equals 8 minutes, according to the principle illustrated in fig. 3. In reading off the graduated limb of the instrument, we must first look to the arrow at zero on the vernier, and having read the number on the primary graduated scale of divisions next this arrow, which appears upon the zero side of the primary scale, we next look along the movable vernier, and add the number of divisions indicated by the stroke which most nearly coincides with a division on the primary graduated limb. We are not concerned as to what division upon the graduated limb is so cut, our object being only to arrive at the fractional proportion of the division upon the graduated limb at which the arrow on the vernier stands, this fractional amount being indicated by the number on the vernier which coincides with a stroke on the primary scale. When a coincidence is observed, as in fig. 6, simultaneously at the zero and the last stroke on the vernier, it indicates zero to be added, and the division on the graduated limb which coincides with the arrow marked at zero upon the vernier indicates exactly the amount. Fig. 8 illustrates a vernier reading to 20 seconds, 59 divisions on the primary scale are divided into 60 divisions upon the vernier, and the result gives $\left(\frac{1}{59}-\frac{1}{60}\right) = \frac{1}{3540}$ of a length of $19\frac{2}{3}$ degrees, or $\frac{1}{3540}\times\frac{59}{3} = \frac{1}{60}$ of each subdivision or 20 seconds. Hence upon the vernier scale, for sake of clearness in reading, every third stroke only is marked. Other verniers can be similarly constructed, but figs. 4 to 8 illustrate those most generally adopted.

Flour Mill, Silloth.—In the paragraph which appeared in our last (pp. 63-64) relating to this building, mention was made of the adjoining North British Railway Co.'s warehouse (or granary). We are asked to state that the whole of the constructional ironwork for the granary was supplied and erected by Messrs. Gardner, Anderson,'& Clarke, with the exception of the concrete floors and window sashes.

MEETINGS.

MONDAY, JANUARY 10.

Royal Academy.—Mr. J. E. Hodgson, R.A., on "Art a Universal Language." III. 8 p.m.

Surveyors' Institution.—Continued discussion on "The Tithe Question." 8 p.m.

Inventors' Institute.—Mr. S. J. Mackie, C.E., on "The Origin and Objects of the Inventors' Institute." 8 p.m.

Liverpool Architectural Society.—Mr. F. M. Evanson on "Public Hydraulic Power for Lifts and Warehouse Machinery." 7 p.m.

Leeds and Yorkshire Architectural Society.—Major J. Whitacre-Allen on "Drawing: its Importance in Education."

Society of Antiquaries of Scotland (Edinburgh).—8 p.m.

TUESDAY, JANUARY 11.

Institution of Civil Engineers.—Further discussion on Professor Kennedy's paper on "The Use and Equipment of Engineering Laboratories." 8 p.m.

Society of Biblical Archæology.—The Rev. C. J. Ball on "The Inscribed Stones from Hamath." 8 p.m.

Manchester Architectural Association.—Mr. W. H. Littlewood, A.R.I.B.A., on "Recollections of an Italian Tour." 7·30 p.m.

WEDNESDAY, JANUARY 12.

York Architectural Association.—The Rev. E. M. Cole, M.A., on "The Stratigraphical Geology of Yorkshire, with reference to Building Materials." 7·45 p.m.

THURSDAY, JANUARY 13.

Royal Academy.—Mr. J. E. Hodgson, R.A., on "Art a Universal Language." IV. 8 p.m.

Society of Telegraph-Engineers and Electricians.—8 p.m

Miscellanea.

The Engineering Trades. — Messrs. Matheson & Grant's "Engineering Trades' Report" for the half-year ending Dec. 31st, says that the year just closed has been one of the worst ever experienced in the engineering trades, but in several branches a slight improvement has set in which bids fair to continue, and the prospects for the coming spring are brighter than they have been for the last two years. The revival of railway enterprise in the United States has given great impetus to the iron and steel trades of that country, and though free exchange with great Britain is restricted by their fiscal system, the intimate connexion between the two countries has always led to a corresponding improvement here. Coal has been cheaper than ever during the last year. The continued fall in the prices of pig-iron during the first half of 1886 was arrested by the natural remedy of a reduction in the output, and prices advanced in consequence. The prices of rolled iron have fluctuated during the last six months, and are now slightly higher than in the summer. They would be still higher but for the competition of steel, not only in shipbuilding, but in boilers, bridges, and other structures. At many of the leading rolling-mills Siemens and other steel-making plant has been established to meet the altered demand, and at some of the works favourably situated for suitable ore and fuel the puddling furnaces and other appliances for making wrought iron are likely to be abandoned altogether. Steel, which in the spring and summer of 1886 fell even more rapidly than iron, has during the last few months recovered from 5s. to 10s. per ton. Owing to the collapse of the English and Continental rail-makers' combination, prices of heavy steel rails fell as low as 3*l.* 12s. 6d. per ton, but the price now is from 4*l.* to 4*l.* 5s. Although this recovery is assisted by the considerable manufacture of ship and bridge steel, the immediate cause has been the revival of the American demand. In regard to iron and steel structures, a very large tonnage of bridge work has been made during the past year, most of it for export. International competition depends more than ever on cheap transport. A revision of railway rates to the ports, a simplifying of dock dues, and the utilisation of canals, are immediate remedies which would help British trades, while ocean freights as low as those from Antwerp and Germany, which at present favour Continental manufacturers, are necessary if the export of engineering material is to be maintained and extended.

Discovery of an Old Viking Ship in Norway.—The remains of an old Norse Viking ship were discovered in Norway last autumn. The ship was found in an old tumulus on the farm Gunnarstorp, in Southern Norway. Its length is 26 ft., but the vessel, though of oak, is not in a very good state of preservation. Wool has been used for calking. In the tumulus were also found eighteen semi-globular pieces of amber, apparently used for playing with, and seventeen conical stones. It is believed that the vessel dates from the tenth century. There are several other tumuli in this part of Norway.

The Wood Market.—Messrs. James Smith & Co.'s (Liverpool) Wood Circular and Prices Current for the 3rd inst. says:—"The wood market shows more than the usual falling off in the consumption at this season of the year. This has been caused by the stormy weather and hard frost (suspending building operations), the hardening of the Money Market, complication on the Continent, and the unsettled state of our Government at home. This state of things has tended to deter buyers from increasing their stocks until the year is fairly advanced, when business may be more settled. Another stoppage in our trade this week has not tended to strengthen confidence, and goes to show the weakness of our trade, caused by the last few years' unsatisfactory business. On the other hand, the stocks are light, and sellers show more firmness, but, our markets being so sensitive, it is doubtful if this can be maintained should the supplies be at all excessive. Railway traffic returns continue to show an increase, which is a favourable feature."—— Messrs. Foy, Morgan, & Co.'s "Annual Wood Report, 1886," says:—"The year just elapsed has been another in the cycle of bad years, from which the wood trade, in common with so many other interests, has suffered severely. Profits have been all round on the usual vanishing scale, and competition has been as keen as ever. Importers have, as a rule, done little more than get their money back, and market buyers have secured but a meagre return for their labours. The cause of this dulness is undoubtedly to be found in the general commercial depression which has enveloped all European countries, and almost every interest. The building trade has been in a deplorable state, as evidenced by the unremunerative prices at which contracts are eagerly taken, and in the depressed value of building land. Although all the principal wood-producing districts have diminished their supply to this country, and notwithstanding the fact that the dock stock is moderate, there seems no immediate prospect of any revival in business, and the deliveries from the docks, smaller by 20 per cent. than the average of the last four years, betoken that the supply is fully equal to any demand that can reasonably be anticipated. Auctions have not been so heavy as in the preceding years, the market having been obviously too weak to bear the pressure of large forced sale."

The Roman Baths at Bath.—At a meeting of the Bath Town Council on Tuesday last, one of the items on the agenda had reference to some communications received by the Mayor from the Society of Antiquaries and Mr. C. Roach Smith on the subject of the Roman baths. Alderman Wilkinson moved that the consideration of this matter be postponed till their next meeting. His reason for making the request was that the Baths Committee considered it very desirable that an unbiassed opinion should be obtained after a thorough inspection by an independent architect as to the construction and stability of the work now being carried out in York-street and Stall-street, and also as to the best arrangement of the basement with regard to the Roman remains on the site of the two houses lately removed. They therefore requested the Town Clerk to write to Sir James McGarel Hogg, Chairman of the Metropolitan Board of Works, to ask him to name an architect to undertake this duty. Sir James recommended Mr. Waterhouse. Negotiations were entered into with him, and he arranged to be here on the 3rd. In accordance with that arrangement he commenced his inspection on Monday, and his report would be presented in due course. Under those circumstances, the Committee asked that the report of Mr. Waterhouse should be considered in conjunction with the others. He therefore moved that the matter be postponed.—This was agreed to.

The "Black and White" Buildings of Cheshire.—At the last meeting of the Chester Archæological and Historic Society, Mr. Alfred Rimmer read an interesting paper on "The Black and White Half-Timber Architecture of England, with Special Reference to Chester and its Neighbourhood." In his concluding remarks he recommended, for the purposes of timbering, the black walnut of America, a wood which, he said, deserved to be better known in this country. "By getting it ready cut and mortised from the United States they would be able to erect timbered houses very cheaply, and perhaps see a revival of this beautiful, irregular, and picturesque style in England."

New Public Washhouses in St. Marylebone, in connexion with the St. Marylebone Baths, in the Marylebone-road, were opened on the 28th ult. There have been washhouses there for many years, but they were in many respects inconvenient, and the Commissioners lately resolved to pull them down and erect new ones, fitted with every modern convenience. The work was entrusted to Mr. J. Waldram, C.E., of Craven-street, Charing-cross, who has designed the new buildings and superintended their construction. In the basement is a new main room, where the various mains, also new, are painted of different colours, according to their uses, the manipulation of them being thus rendered more easy and certain. Also in the basement are four boilers, for supplying water and steam; a new engine of six horse-power nominal, for driving the machinery, and furnaces to heat the drying closets. Over the basement is a fireproof roof, on which rests the floor of the laundry, which is paved with slates, and adequately supplied with drainage, so that it cannot be sloppy. The laundry is of the same size as before, but the roof, now of iron and glass, has been carried to a height of 30 ft. Here are the washing boxes, sixty in number, each box having one division to serve the purpose of a copper for boiling the clothes, and another for washing them, with taps for hot and cold water and steam. Formerly the wringing machines were worked by hand, but now there are three steam wringers, working at a speed of a thousand revolutions a minute. The drying closets are twice as numerous as before. There is also an ironing stove. For the use of all these appliances,—for everything, in short, except soap and soda,—the washers pay three-halfpence an hour, and a fortnight's wash of a working man's household is commonly done in two hours.

Explosions of Kitchen Boilers.—An inquest was held on Tuesday by Dr. Diplock, at Acton, touching the death of Fanny Prichard, housekeeper at No. 1, Oakfield House, Avenue-gardens, Mill Hill Park, who was killed instantaneously on Sunday afternoon by the explosion of the kitchen boiler, Harriet Prichard, sister of the deceased, and engaged as cook in the same house, stated that previous to lighting the fire on Sunday at twelve o'clock, they had had no fire on that day. James Hedges, builder, who was called to the house shortly after the explosion, gave it as his opinion that there had been no fire on for some time. The water in the supply-pipes was frozen, and a fire being lit in the kitchen for a few hours on Sunday would cause the water in the boiler to boil away. The supply pipes being frozen would leave the boiler dry; and after a time the boiler would get red hot, and the heat from it would be conducted up the pipes until it reached the ice, which would melt and run suddenly into the boiler. The boiler being, as it were, sealed, with no escape for the steam, an explosion would result. A juryman (Mr. Rolls, a builder) stated that there was a valve sold for placing on kitchen boilers which prevented explosions, and should be used in every case. The jury returned a verdict of "Death from the accidental exploding of a kitchen boiler," the Coroner remarking that during his nineteen years' experience as a coroner he had had before no similar case. That day he had two; the other case was that of a boy at Shepherd's Bush, who had been killed by the explosion of a kitchen boiler.—*Times*.

Birmingham Architectural Association. The fourth ordinary meeting of the current session was held at Queen's College on Tuesday evening, January 4th; the Vice-President (Mr. John Cotton) was in the chair. Messrs. W. H. Bidlake, M.A. (Cantab.) and E. J. Hickin were elected members of the Association. A paper was read by Mr. T. Camm on "Art in Glass in Relation to Architecture." The lecture was illustrated with some very fine drawings and examples of various periods of glass. A vote of thanks, proposed by Mr. W. Henman and supported by Mr. Victor Scruton (hon. secretary) and the Chairman, was unanimously accorded to the author for his interesting paper. After a response from Mr. Camm the meeting terminated.

Reddish.—A two-light window in the chancel of St. Mary's Church, Reddish, near Stockport, has lately been filled, to the memory of members of the present rector's family. The subject is the Resurrection, and the artists entrusted with the work were Messrs. Mayer & Co.

New Buildings in Eastcheap.—Amongst the several new buildings which have just been erected in Eastcheap, consequent upon the widening of that thoroughfare in connexion with the Inner Circle Completion Railway, is a large and prominent structure, not far from the junction with Gracechurch-street, and which is now ready for occupation. The building has been erected with a view to its utilisation for the tea and foreign fruit trades, two mercantile industries which have their centres in this part of the City. The building has a frontage of 100 ft. in length, and is 85 ft. high, containing six stories, and occupying a ground area of 10,000 ft. The ground-floor portion of the frontage is relieved with polished red Aberdeen granite pilasters and columns, surmounted by capitals containing carving in stone emblematical of the fruits produced by various countries. The elevation of the upper floors is in six bays, divided by fluted pilasters, and again sub-divided by moulded and fluted mullioned windows. Above the ground-floor a deep carved frieze runs across the frontage, enriched by a profusion of carving. The interior of the building has been elaborately fitted and decorated. A large corridor 10 ft. in width, on the ground-floor, connects Eastcheap on the north with George-lane on the south, whilst on the floors above the east and west sides are also connected by corridors. In addition to the staircases access to the upper floors is also obtained by two hydraulic lifts running from the basement to the top of the building. They are worked from the mains of the Hydraulic Power Company, and fitted with Messrs. Waygood's patent safety check. A large amount of ironwork has been used in the construction of the building, some of the stanchions and girders weighing forty tons each. Mr. Delissa Joseph is the architect, and the general contractors Messrs. Perry & Co., of the Tredegar Works, Bow; Mr. Richardson being clerk of the works. The mosaic flooring has been supplied by Messrs. Diespeker & Co. The stoves and mantels are by Messrs. Chambers, Monnery, & Co., and the carving by Mr. Gilbert Seale.

Monument to the Emperor William.—In view of the ninetieth anniversary of the birth of the Emperor William of Germany, which will take place on the 22nd of March next, the Berliners are already making preparations for celebrating this event, but how the design is to be carried out is not yet settled. One committee has been organised which purposes to erect a huge obelisk at one of the most prominent points in the city in honour of the nonogenarian Emperor. It was at first suggested that the structure should be an imitation of one of the ancient Egyptian obelisks of which we still possess several samples, and should even be ornamented with hieroglyphics, but it was subsequently decided that if this project is carried out the obelisk shall be of an entirely new design. A majority of the population of the German capital, however, appears to be opposed to this scheme. It is contended that Berlin is not by any means rich in monuments, and that the idea of an obelisk is quite unsuitable. Why not, it is asked, erect a pyramid or even a Greek temple? What may be the ultimate form of the monument will, however, have to be decided upon very soon, as the date for laying the foundation-stone will be the Emperor's birthday.

Churches Burned Down.—On Sunday morning last, the Church of St. John the Evangelist, at Ranmoor, which is a suburb of Sheffield, was destroyed by fire. The church was opened nine years ago to meet the needs of the increasing population at the west end of Sheffield.——The Roman Catholic Church of St. Thomas of Canterbury at St. Leonard's was completely destroyed by fire on Tuesday morning.

Results of Auction Sales in 1886.—From official particulars contained in the *Estate Exchange Registers*, we learn that the total amount of the sales at the Auction Mart for the year ending 25th of December last was 4,120,044*l.* The totals for the three previous years were as follow:—1883, 5,147,685*l.*; 1884, 5,976,931*l.*; 1885, 4,453,878*l.*

The Last of the Colonial and Indian Exhibition.—It will be seen by an advertisement in this week's *Builder* that Messrs. Horne, Son, & Eversfield will, on Wednesday, January 19, and following days, hold an important sale of materials at South Kensington. "Old London" and the Indian Palace will soon be things of the past.

The Plumbers' Company.—At the Quarterly Court held on the 29th ult., beyond the formal business, special Christmas gratuities were made to each of the pensioners on the company's pension list, and in addition the Master of the Company (Alderman Stuart Knill) presented the widow of each freeman with an annual grant of ten shillings payable to poor widows out of the City cash and in his gift as Alderman. A valuable piece of plate was presented to the late Master of the Company (Mr. George Shaw, C.C.) upon his retirement from three successive years' Mastership, in recognition by the Company of his able and zealous services in promoting the better education and registration of plumbers. It was reported that upwards of 250 plumbers (masters and journeymen) had been passed during the quarter by the Registration Committee (of which Mr. Shaw is chairman) as having qualified themselves for enrolment upon the company's register by giving satisfactory evidence of experience, or passing a practical examination.

The Jubilee and Sanitary Improvement. Mr. Mark H. Judge, as a member of the Paddington Victoria Jubilee Committee, has given notice that he will propose the following resolution:—"That in the opinion of this Committee the dust-collecting and other trades which are carried on in connexion with the canal basin, between Warwick-crescent and Praed-street, besides being a continual menace to the health of the parish, are, during the summer months, a serious danger to the inmates of St. Mary's Hospital, and a source of annoyance to the Great Western Railway Terminus, which is often visited by Her Majesty the Queen and the Ministers of the Crown; that the Committee therefore considers that no better memorial of the Victorian Jubilee could be devised in Paddington than for the Vestry to purchase the canal basin and adjacent property, in order that this long-standing nuisance may be abolished and the site profitably utilised for residential and other purposes."

Innholders' Hall.—The new hall of the Innholders' Company, which has been erected upon the site of the old one in Little College-street (formerly Elbow-lane), was opened last month. The old hall is believed to have been the joint work of Wren and Mr. Jarman, the then City Architect, and was erected soon after the Great Fire in 1666. In some way not made quite clear in the account published in the *Citizen*, the building was allowed to get into a very dilapidated and even dangerous condition, and in November, 1882, the architect of the new hall, Mr. J. Douglass Mathews, was requested to make a survey of the old buildings, and some temporary repairs were made, but in December, 1884, other defects occurred that made it necessary for something of an extensive nature to be done, especially to the roofs and walls. The Court being extremely reluctant to destroy the traditions and old associations by entirely removing the buildings, considered the best means to be adopted to repair it; but this being found in a great measure impracticable, adopted the recommendation of the architect to preserve the old Court-room and the Livery Hall, as being the special portion of interest, and take down and rebuild the remainder of the premises. The works were commenced in the Autumn of last year. They comprise the re-building of the front portion and re-roofing the Livery Hall. The old doorway has been carefully reproduced in moulded brick, and the old door and frame, with canopy and arms, refixed. The entrance-hall, which is panelled in oak, has an angle fireplace and an ornamental oak screen to the staircase. On the right is the old Court-room, which is unaltered, except that in re-building an extra width has been obtained. The paint from the wainscoting has been removed, and the oak is again visible, whilst the ceiling has been repaired where defective, and effectively decorated. A new panelled ceiling has been placed in the Livery Hall, which is entered from the entrance-hall by a new doorway, and has been re-roofed. The works have been carried out by Messrs. Brass & Son, builders, of Old-street; the cooking apparatus by Messrs. Waller & Son, of Fish-street-hill; the gas-fittings by Messrs. Strode, of St. Paul's-churchyard; and the stained-glass by Messrs. James & Co., of Kentish Town. The whole has been executed from the designs and under the immediate superintendence of the architect, Mr. J. Douglass Mathews, of Dowgate-hill.

The Late Mr. Colin Minton Campbell.—On Saturday afternoon the Duchess of Sutherland unveiled a bronze statue of the late Mr. Colin Minton Campbell, head of the firm of Mintons, and late M.P. for North Staffordshire, at Stoke-upon-Trent. The Marquis of Lorne said the Duchess wished him to express the very great pleasure she had had in being present on the occasion, and being able to greet that most admirable, most excellent likeness of the late Mr. Minton Campbell. He was glad to see that statue as a memorial of the great success which English manufacture had always achieved in the ceramic art, a success which each exhibition in every succeeding decade had emphasised more and more. In whatever branches foreign nations had been able to get the better of us, certainly in the ceramic art they had never got the better of Stoke-upon-Trent. [Mr. J. C. Horsley, writing to the *Times* in reference to this utterance, says that the Marquis of Lorne was "presumably in happy ignorance of the fact that the very firm (Mintons) he was so eloquently applauding has been for years past and is now entirely in the hands of foreigners as far as the art of ceramic work is concerned, it being in this respect under the sole direction of a Frenchman, who controls everything in the shape of design, which is carried out by French modellers and French painters to the exclusion of English artists, save in very subordinate positions."]

Trade Mems.—Mr. Frederick Higgs, builder, of Station Works, Loughborough Junction, announces that he has taken into partnership Mr. Henry F. Higgs (younger son of the late Mr. Wm. Higgs, of Crown Works, South Lambeth). The style of the firm will be "F. & H. F. Higgs."——Messrs. J. Wontner Smith, Son, & Co., hot-water engineers, of Finsbury-pavement, announce that Mr. George Gray, jun., who has assisted in the management of the business since the death of Mr. Joseph Wontner Smith, sen., has now become a partner, and that in future the style of the firm will be "J. Wontner Smith, Gray, & Co."

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 0 0
Teak, E.I. ....load	9 0 0	14 0 0
Sequoia, U.S. ....foot cube	0 2 4	0 2 7
Ash, Canada ....load	3 0 0	4 10 0
Birch ,, ...	2 5 0	3 10 0
Elm ,, ...	3 10 0	4 10 0
Fir, Dantsic, &c.	1 10 0	4 0 0
Oak ,, ...	2 10 0	4 10 0
Canada	3 0 0	6 0 0
Pine, Canada red	2 0 0	3 10 0
,, yellow	2 5 0	4 0 0
Lath, Dantsic ....fathom	3 0 0	5 0 0
St. Petersburg	4 0 0	5 10 0
Wainscot, Riga ....log	2 15 0	4 0 0
,, Odessa, crown	3 5 0	3 7 6
Deals, Finland, 2nd and 1st...std.100	7 0 0	8 0 0
,, 4th and 3rd	6 0 0	6 10 0
Riga	5 10 0	7 0 0
St. Petersburg, 1st yellow	8 10 0	14 0 0
,, 2nd ,, ...	7 0 0	8 0 0
,, white	7 0 0	10 0 0
Swedish	6 0 0	15 0 0
White Sea	7 0 0	17 10 0
Canada, Pine, 1st	17 0 0	29 0 0
,, ,, 2nd	11 0 0	17 0 0
,, ,, 3rd, &c.	8 0 0	8 0 0
,, Spruce, 1st	8 0 0	11 0 0
,, ,, 3rd and 2nd	5 0 0	7 10 0
New Brunswick, &c.	5 0 0	7 0 0
Battens, all kinds	4 0 0	12 0 0
Flooring Boards, sq. 1 in., Prepared, first	0 9 0	0 13 0
Second	0 7 6	0 8 6
Other qualities	0 5 0	0 7 0
Cedar, Cuba ....foot	0 0 3	0 0 3½
Honduras, &c.	0 0 2½	0 0 3½
Australian	0 0 2	0 0 3
Mahogany, Cuba	0 0 4	0 0 7
St. Domingo, cargo average	0 0 4	0 0 7
Mexican ,, ...	0 0 3½	0 0 4½
Tobasco ,, ...	0 0 4	0 0 6
Honduras ,, ...	0 0 4	0 0 6
Maple, Bird's-eye	0 0 6	0 0 8
Rose, Rio ....ton	7 0 0	10 0 0
Bahia	6 0 0	10 0 0
Box, Turkey	5 0 0	17 0 0
Satin, St. Domingo ....foot	0 0 6	0 0 10
Porto Rico	0 0 7	0 1 0
Walnut, Italian	0 0 4	0 0 5

METALS.		
IRON—Bar, Welsh, in London....ton	4 7 6	4 15 0
,, ,, in Wales	4 2 6	4 7 6
,, Staffordshire, London	5 10 0	6 0 0
Sheets, single, in London	6 15 0	8 10 0
Hoops ,, ...	6 0 0	7 0 0
Nail-rods ,, ...	5 15 0	6 10 0
COPPER—		
British, cake and ingot ....ton	42 10 0	43 0 0
Best selected	43 0 0	43 10 0
Sheets, strong	50 0 0	51 0 0
Chili, bars	38 10 0	38 17 6
YELLOW METAL ....lb.	0 0 4	0 0 4½
LEAD—		
Pig, Spanish ....ton	13 12 6	13 13 9
English, common brands....	13 17 6	0 0 0
Sheet, English	13 15 0	13 17 6
SPELTER—		
Silesian, special ....ton	14 5 0	14 7 6
Ordinary brands....	14 2 6	14 5 0
TIN—		
Straits....ton	99 15 0	0 0 0
Australian	100 0 0	0 0 0
English ingots	104 0 0	0 0 0

OILS.		
Linseed ....ton	20 5 0	20 10 0
Cocoanut, Cochin	37 10 0	0 0 0
Ceylon	26 10 0	0 0 0
Palm, Lagos	23 0 0	23 10 0
Rapeseed, English pale	22 5 0	22 10 0
,, brown	21 0 0	0 0 0
Cottonseed, refined	18 10 0	19 10 0
Tallow and Oleine	25 0 0	45 0 0
Lubricating, U.S.	6 0 0	10 0 0
,, refined	8 0 0	13 0 0
TURPENTINE—		
American, in casks ....cwt.	1 7 0	0 0 0
TAR—		
Stockholm ....barrel	0 15 0	0 15 6
Archangel	0 11 6	0 12 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Proposed Cemetery Buildings	Fareham Local Board...	Not stated	Feb. 3rd	i.
Exhibition Buildings	Glasgow Int. Ex., 1888	150 gs., 100 gs., & 50 gs.	March 1st	ii.
Asylum Buildings	Borough of Maidstone	Not stated	do.	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Pipe-Laying	St. Helen's Corporatn	D. M. F. Gaskin	Jan. 11th	ii.
Removal of Dust, &c.	Crown Est. Paving Com.	*Official*	Jan. 12th	ii.
Additions to Hotel, Seaton, Devon	The Proprietors	F. Eggar....	Jan. 17th	ii.
Works and Materials	Wandsworth Bd. of Wks	*Official*	Jan. 18th	ii.
Construction of Two Iron Rooms....	Com. of H.M. Works...	do.	Jan. 19th	ii.
Dwelling-House, Stables, &c.	....	Owen Lewis	Jan. 20th	ii.
Works and Materials	St. Marylebone Vestry	*Official*....	do.	xiii.
Breeze, Ashes, and Dusting	do.	do.	do.	xiii.
Horses and Slop Carts	do.	do.	do.	xiii.
Watering Streets and Roads....	do.	do.	do.	xiii.
Broken Stone, &c., for Paving	do.	do.	do.	xiii.
Clinker Brick Paving	Beckenham Local Brd.	G. B. Carlton	Jan. 24th	ii.
Stoneware Pipe Sewers	do.	do.	do.	ii.
Widening and Repairing Roadways, &c.	Tottenham Local Board	— De Pape	Jan. 25th	ii.
Construction of Reservoir	Northwich Local Board	H. Bancroft	Feb. 1st	ii.
Pupil Teachers' Centre	Schl. Board for London	*Official*	Not stated...	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Assistant Engineer	Civil Service Com.	Not stated	Jan. 18th	xvi.

TENDERS.

BARNET.—For the erection of a pair of semi-detached villa-residences, Potter's-road, New Barnet:—

F. J. Wheeler, North Finchley	£1,098	0	0
D. Green, Gracechurch-street	1,094	0	0
J. Haynes, New Barnet	1,050	0	0
E. Wildman, Chiswick	915	0	0
A. R. Flew & Co., West Kensington	900	0	0
S. Woodhall, Whetstone	898	0	0
Henley & Co., Upper Norwood	898	0	0
F. Voller, Wood Green	830	0	0
J. Ellwood, New Barnet	827	0	0
J. Scarborough, Bowes Park	795	0	0
J. P. Groome, New North-road	765	0	0
W. J. Cude, Archway-road	759	0	0
W. Pavey, Winchmore Hill	730	0	0
Harrison & Crabb, Enfield*	629	0	0

* Accepted.

BROXBOURNE.—For building a house at Broxbourne, Herts. Mr. George Vigers, architect:—

Puzy & Lumley	£1,250	0	0
Craske	1,249	0	0
Hunt	1,230	0	0
Bristley & Co.	1,219	0	0
Alexander	1,197	0	0
Bentley	1,097	0	0
David Brown & Co.	1,047	0	0

CULLOMPTON.—For the erection of two houses in Fore-street, Cullompton, for Mr. J. Plumpton. Messrs. Wilkinson & Warren, architects and surveyors, Exeter:—

Short, Silverton	£1,068	0	0
J. G. Stephens, Exeter	959	0	0
Incledon & Perkins, Cullompton	921	14	0
Turner & Skinner, Honiton	920	0	0
Goff & Perkins, Cullompton*	830	0	0
Goff & Ireland, Kentisbeare	805	0	6
Grainger, Clisthydon	712	0	0

* Accepted.

EASTBOURNE.—For the erection of a sanatorium on the site of the existing fever hospital, for the Corporation. Mr. Alfred A. Oakden, architect. Quantities supplied:—

	Building.			Making Road and Levelling Site.		
J. Wood	£7,580	0	0	£425	0	0
J. Russell	7,374	0	0	—		
C. Wren	7,280	0	0	475	0	0
J. Peerless	7,026	0	0	606	0	0
J. Hayward	6,981	16	2	374	19	7
Cornwall & Son	6,575	0	0	450	0	0
Stevens & Pattenden	6,547	17	4	296	11	0
J. Martin	6,545	5	0	295	15	0
Newman & Hart	6,451	0	10	287	10	9
Dore & Son	6,354	0	0	313	0	0
G. Hartfield	—			288	0	0

KENSINGTON.—For the erection of the Queen's Club, West Kensington. Mr. W. C. Marshall, architect. Quantities by Mr. E. J. Pain:—

Colls & Sons	£14,701	0	0
Patman & Fotheringham	14,507	0	0
Rider & Sons	14,328	0	0
Nightingale	14,175	0	0
Bywaters	13,882	0	0
Brass & Son	13,869	0	0
Perry & Co.	13,500	0	0
Peto Bros. (accepted)	13,500	0	0

LONDON.—For alterations at the Milford Haven public-house, 214, Caledonian-road. Mr. R. A. Lewcock, architect, Bishopsgate-street, Within:—

General Contractor.

J. Walker	£350	0	0

Pewterer.

T. Heath	125	0	0

Gasfitter.

J. Steadman	91	0	0

LONDON.—For alterations at the Plough tavern, 201, Hoxton-street. Mr. R. A. Lewcock, architect:—

S. Goodall	£403	0	0
J. Walker	398	0	0
C. Batchelder	398	0	0
Finch	391	12	0
Birch & Co.	359	0	0
J. Ivory	349	10	0
Steel Bros.	330	0	0
Jackson & Todd	330	0	0
Spencer & Co.	325	0	0

Gasfitter.

Steadman	£30	0	0
Ungar	19	17	6
Christian	16	7	0

LONDON.—For improvements at 331, Edgware-road, W. Mr. R. A. Lewcock, architect:—

Batchelder	£203	15	0
Pringle	167	0	0
Belleni	129	10	0
Dainton	126	0	0

LONDON.—For new coffee-tavern, Victoria Docks, E. Edward J. Thomas, A.R.I.B.A., architect, Mark-lane. Quantities supplied:—

Shepherd	£3,724	0	0
Maddison	2,715	0	0
Banbury	2,575	0	0
Holland	2,349	0	0
Elkington	2,280	0	0
Patman & Fotheringham	2,130	0	0
Priestley	2,070	0	0

SUNDERLAND.—For the erection of the new Municipal Buildings. Mr. Brightwen Binyon, architect, Ipswich. Quantities by Mr. G. D. Irwin, Sunderland:—

G. Grimwood & Sons, Sudbury	£27,890	0	0
W. Scott, Sunderland	25,583	0	0
J. H. Thorpe, Leeds	24,967	10	0
W. Thornton & Sons, Liverpool	24,435	0	0
C. Jackson, Newcastle	24,433	12	0
J. Elliot, North Shields	24,265	0	0
T. P. Shaftoe, Sunderland	24,091	10	0
J. W. Beanland, Bradford	23,997	0	0
S. Warburton, Manchester	23,900	0	0
E. H. & G. Allison, Sunderland*	23,870	0	0

* Accepted.

[Architect's estimate, 25,000*l.*]

** The above tenders are exclusive of the heating and ventilation, which it is estimated will not exceed 1,100*l.*

TIVERTON.—For the erection of four houses on the St. Aubyn's Estate, Tiverton, for Mr. W. Hellings Lloyd. Messrs. Wilkinson & Warren, architects and surveyors, Exeter:—

Pyle & Grater Bros., Tiverton	£3,940	0	0
Barrons, Tiverton	3,600	0	0
Scadding & Son, Exeter	3,200	0	0
J. G. Stephens, Exeter (accepted)	3,175	0	0
Manning & Collard, Tiverton	2,958	0	0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., *not later than Four p.m.* on THURSDAYS.

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L. H.—F. T.—A. J. M.—J. A. A.—R. G. P. (thanks; but it is hardly of sufficient interest for publication).—E. I. B.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

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